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Morphological-based phylogeny and revision of *Ciminius* Metcalf and Bruner, 1936 (Hemiptera, Cicadellidae)

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https://zoobank.org/2C2A766C-E116-4A92-BB21-9181422D9122

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Received 06 September 2024
Accepted 28 January 2025
Published 18 June 2025

Academic Editors Lara-Sophie Dey, Monica Solorzano-Kraemer

Citation: Alasmar L, Domahovski AC, Cavichioli RR (2025) Morphological-based phylogeny and revision of *Ciminius* Metcalf and Bruner, 1936 (Hemiptera, Cicadellidae). Arthropod Systematics & Phylogeny 83: 231–285. https://doi.org/10.3897/asp.83.e143754

Abstract

In a morphological-based analysis using implied weighting for 23 taxa and 50 characters, we provided a phylogenetic study for *Ciminius*. The genus was recovered as monophyletic with a high support. We also provided a taxonomic revision, with description of three new species, increasing the diversity of *Ciminius* from seven to ten species: the Neotropical *C. albolineatus*, *C. callosa*, *C. platensis*, *C. yana*, *C. autumnalis* **sp. nov.**, *C. dissidens* **sp. nov.**, *C. sesamum* **sp. nov.**, and the Nearctic *C. hartii*, *C. sidanus*, and *C. taosus*. A new monotypic genus, *Arcanus* **gen. nov.**, recovered as sister to *Ciminius* is described. *Tylozygus* Fieber, the new genus, and *Ciminius* were recovered forming a clade here nominated as Articulate Stem Clade, due to its unique connective morphology amongst all Cicadellini. The immature stages of *Ciminius* sp. are described and a key to males, an occurrence map, and notes of parasitism and submacroptery are provided. We discussed the *Ciminius* relationships according to our analysis, the genus distribution, and the taxonomic problems about *C. callosa.*

Keywords

Auchenorrhyncha, Cicadellini, Neotropical region, Nearctic region, new taxa, sharpshooters

1. Introduction

The genus *Ciminius* was erected by Metcalf and Bruner in 1936 to accommodate the species *Tettigonia hartii* Ball, 1901 recorded from Cuba and United States. Afterward, DeLong and Knull (1946) transferred *Cicadella taosa* Ball, 1936 and *Cicadella sidana* Ball, 1936 to *Ciminius*. Oman (1949) described and illustrated *Ciminius* male genitalia for the first time. The species *Ciminius platensis* was once described as *Acocephalus dubius* Berg, 1879, then transferred to the genus *Tettigonia* by Berg in 1884 (Young 1977). Although the epithet "*dubius*" was preoccupied, Berg (1884) proposed *Tettigonia platensis* as a nomen novum to *Tettigonia dubia*. Young (1977) transferred the species *Tettigonia platensis* (Berg, 1879), *Tettigonia albolineata* Taschenberg, 1884, and *Cicadella callosa* Osborn, 1926 to *Ciminius*, the latter described based on a female holotype. In the same work, the author described *Ciminius yana* Young, 1977 based on specimens from Mato Grosso State, Brazil, provided a key to

males and illustrations of wings venation and genitalia for males and females. Young's work (1977) also highlighted the similarity of the holotype of *C. callosa* with the specimens of *C. platensis*, as well as the overall resemblance in male genitalia characters of *C. hartii*, *C. taosus*, and *C. sidanus*.

Throughout history, the species *Tettigonia hartii* has had its name misspelled in some publications, including the author himself, in the original description of *C. sidanus* and *C. taosus* work (Ball 1936). Due to this fact, it is highly probable that Young replicated this error in his work from 1977. In his catalog, McKamey (2007) cites the name *Ciminius harti* as erroneous and, following the premise of the Code of Zoological Nomenclature, *Ciminius hartii*, as originally described, is the correct name and will be used herein.

Ciminius is composed of robust rather small sharpshooters, with coloration varying from pale yellow to black, and is abundant in grassland fields. According to Young (1977), this genus is related to *Tylozygus* Fieber, 1866 but can be differentiated from them and all the other Cicadellini genus by the combination of two characters: (1) forewings with only two anteapical cells, with the outer one opened basally, and (2) stem of connective occurring as a separate sclerite in male genitalia. Until the present moment, there are seven valid species: *C. taosus* and *C. sidanus* with a Nearctic distribution and *C. albolineatus*, *C. callosa*, *C. platensis*, and *C. yana* with a Neotropical distribution, which are also recorded for Brazil. *Ciminius hartii* is known mainly from the Nearctic region (USA), but is also recorded from southern Mexico and Cuba in the Neotropic (Morrone et al. 2022).

Cicadellini representatives are considered as potential vectors of *Xylella fastidiosa* (Wells et al. 1987) and *Ciminius* specimens are frequently collected in studies of citrus variegated chlorosis (CVC). However, there is no confirmation that *Ciminius* specimens can cause indirect damage to citrus crops (Remes Lenicov et al. 1999; Redak et al. 2004; Remes Lenicov et al. 2006; Galdeano et al. 2009). The most recent works of the genus are records of specimen's association with crops of *Citrus sinensis* (Remes Lenicov et al. 1999), rice, cotton, and corn (Remes Lenicov et al. 1985), garlic (Galdeano et al. 2009), sorgum (Remes Lenicov et al. 2006) and *Vicia villosa* (Paradell et al. 2014). Also, there are records of predation of *C. hartii* by *Bembecinus godmani* Cameron, 1890 (Hymenoptera: Sphecidae) (Krombein and Willink 1950), and records of parasitism of *C. platensis* eggs by *Anagrus breviphragma* Soyka, 1956 and *Gonatocerus virlai* Triapitsyn, Logarzo and de León, 2007 (Hymenoptera: Mymaridae) (Albarracin et al. 2009; Triapitsyn et al. 2014).

Despite the abundance of *Ciminius* specimens in grasses (Poaceae), the last taxonomic study was realized in 1977. The strong similarity between *Ciminius* species and the occurrence of intraspecific variations, both in male genitalia and overall coloration aspects, indicates the need for a detailed study and revision of the genus. In this present work, we proposed the genus revision, and a phylogenetic analysis based on morphology. We also described three new Brazilian species and the immature stages of *Ciminius* sp., as long as redescriptions and illustrations of the valid species. A new genus *Arcanus* **gen. nov.** is described, based on two specimens from Southern Brazil. A brief discussion involving *C. callosa* and their similarities with *C. platensis*, *C. albolineatus*, and *C. yana* is provided. In addition, notes of parasitism and submacroptery are reported, and an occurrence map and a key to males of *Ciminius* are provided.

2. Material and methods

2.1. Collection, material examined and taxon sampling

In this study, we examined 624 pinned adult specimens of *Ciminius* from the Coleção Entomológica Pe. Jesus Santiago Moure, Universidade Federal do Paraná, Curitiba, Brazil (DZUP). Some paratypes of the new species will be deposited in the Coleção Entomológica Prof. José Alfredo P. Dutra, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil (DZRJ), Coleção Entomológica do Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil (MNRJ) and Smithsonian Institution (USNM). Images of the holotype of *C. callosa* were provided from the Carnegie Museum (CMNH). Images of *C. hartii*, *C. sidanus*, and *C. taosus* types were provided by the Smithsonian Institution, as well as a loan of six specimens of each *C. hartii* and *C. sidanus*, and two specimens of *C. taosus*. Additional material of nymphs and adults, provided by field collections realized between the years of 2021 and 2024, are stored in separated falcon tubes with absolute alcohol, each with proper precedence label. The field collections were made using a sweeping net in grasses around the Universidade Federal do Paraná, nearly to the Setor de Ciências Biológicas, in Curitiba, Parque Estadual de Vila Velha, in Ponta Grossa, and Parque Estadual do Guartelá, in Tibagi, all in Paraná State, and, in Marília, São Paulo State, Brazil, all deposited in the DZUP. The living specimens were extracted from the samples using a home-made photoecletor and fixed directly in ethanol 95%.

All the described *Ciminius* and three additional new species from Brazil were included in the phylogenetic analysis, except for *C. callosa*, known only by two females (holotype and paratype) and an undissected male (allotype) from Bahia State, Brazil (Table 1). The twelve species compounding the outgroup were chosen by the assemblage of *Ciminius* characters. The species of the genera *Chlorogonalia* Young, 1977, *Syncharina* Young, 1977, *Plesiommata* Provancher, 1889, *Cicadella* Latreille, 1817 and *Tylozygus* Fieber, 1866 belong to the *Cicadella* generic group (sensu Young 1977), to which *Ciminius* belongs. The two species of *Rotigonalia* Young, 1977 are part of the *Juliaca* generic group (sensu Young 1977) and the two species of *Segonalia* Young, 1977 do not belong to any group. Also, a representative of the

Table 1. Specimens included in the phylogenetic analysis. Number of analyzed specimens, sex, and type material are provided for each taxon. PT = paratype, HT = holotype, * = specimens studied throughout photography.

Taxon	Specimens		Type	
	♂	♀	♂	♀
Tapajosa ocellata (Osborn)	1	1	—	—
Cicadella viridis Linneaus	1	1	—	—
Chlorogonalia coeruleovittata (Signoret)	1	1	—	—
Plesiommata corniculata Young	1	1	—	—
Plesiommata mollicella Fowler	1	1	—	—
Rotigonalia larissae Cavichioli	—	—	1 (PT)	1 (PT)
Rotigonalia olivacea Cavichioli	—	—	1 (PT)	1 (PT)
Segonalia machadoi Cavichioli and Takyia	—	—	1 (PT)	1 (PT)
Segonalia steinbachi Young	1	1	—	—
Syncharina argentina (Berg)	1	1	—	—
Syncharina punctatissima (Signoret)	1	1	—	—
Tylozygus fasciatus (Walker)	1	1	—	—
Tylozygus geometricus (Signoret)	1	1	—	—
Arcanus **gen. nov.**	—	—	1 (HT), 1 (PT)	—
Ciminius albolineatus (Taschenberg)	1	1	—	—
Ciminius platensis (Berg)	1	1	—	—
Ciminius yana Young	1	1	—	1(HT)*
Ciminius autumnalis **sp. nov.**	—	—	1 (HT), 11 (PT)	5 (PT)
Ciminius dissidens **sp. nov.**	—	—	1 (HT), 44 (PT)	51 (PT)
Ciminius sesamum **sp. nov.**	—	—	1 (HT), 50 (PT)	15 (PT)
Ciminius hartii (Ball)	3	3	—	1(HT)*
Ciminius taosus (Ball)	1	1	—	1(HT)*
Ciminius sidanus (Ball)	3	3	—	1(HT)*

Oncometopia group (sensu Feng et al., 2024), *Tapajosa ocellata* (Osborn, 1926), phylogenetically distant from the ingroup, is included to root the trees.

2.2. Terminology, morphological study, illustration, and label data

For the taxa descriptions and redescriptions, the terminology adopted follows mainly Young (1977), except for head features, which follows Hamilton (1981) and Mejdalani (1998). Wings morphology follows Zahniser (2021). For female genitalia, the terminology follows Nielson (1965), with the use of the term 'gonoplac' as suggested by Mejdalani (1998). The structure and terminology of the immatures descriptions follows Marucci et al. (2000).

For genitalia dissections, the technique follows Oman (1949), with modifications of Domahovski (2024), for both males and females. The structures were analyzed on a concave slide, covered in glycerin, with a Wild Heerbrugg M5 stereomicroscope. Images of the habitus of both immature and adults and male genitalia were taken using a Leica MZ12.5 stereomicroscope with a Mshiwi USB 5MP camera attached. For the comparative immatures photo, the specimens were placed on a petri dish with a thin layer of agar to stabilize the specimens and covered with ethanol 95%. The habitus images were stacked with Combine Z5 software and edited with Adobe Photoshop CS6. Male genitalia were drawn with the software Adobe Illustrator CS6. For the female genitalia plates, the gonoplac, valvulae I and II were detached and temporarily mounted immersed in glycerin on a slide covered with cover slip, to take the images using a Nikon microscope, with a SCMOS 05100KPB camera attached. The images were merged and edited with the Adobe Photoshop CS6 software. The genitalia structures were stored in a small vial with glycerin, attached to the corresponding specimen pin, as suggested by Young and Beirne (1958). The wings were slightly clarified with KOH 10%, in a water bath, for about one minute after boiling and imaged using the same procedure for the female genitalia.

2.3. Phylogenetic analysis

The characters coding was based on direct observations of adult specimens of males and females, coded as binary or multistate, following the homology proposition as suggested by Patterson (1988). The characters were scored as hyphen (–) when inapplicable, and their descriptions and states follows Sereno (2007). The data matrix was constructed in Mesquite v2.75 (Maddison and Maddison 2011). The software TNT v1.5 no tax limit was used to carry out the parsimony analysis (Goloboff and Catalano 2016), using Traditional search, with the Tree-Bisection-Reconnection (TBR) algorithm (random seed = 0, replications = 10000, trees saved per replication = 10). The implied weights (IW) were used, with k value = 3 (default), to discuss our results, in the purpose of down

weighting the characters according to their homoplasy degree and obtaining better resolved topologies (Goloboff 1993).

All characters were treated as nonadditive (Fitch 1971). To calculate the support of our tree we used the symmetric resampling (SR) with 5000 replications (Goloboff et al. 2003) in TNT. The unambiguous characters were shown on our tree using the software WinClada 1.00.08 (Nixon 2002).

2.4. Occurrence map

The occurrence map was performed with the software QGis v. 3.34.9 "Prizren" (https://qgis.org/) with a World shapefile, provided by World Food Programme, (https://public.opendatasoft.com/explore/dataset/world-administrative-boundaries), cropped in the study area. The quoted data were based on Young (1977), McKamey (2007), original descriptions (Ball 1901, 1936; Berg 1879; Taschenberg 1884; Metcalf and Bruner 1936; Young 1977), Catálogo da Fauna Brasileira (Takiya et al. 2024), and labels of deposited specimens in the DZUP collection. In total, 95 distribution occurrences were included.

3. Results

3.1. Taxonomy

3.1.1. *Ciminius* Metcalf and Bruner, 1936

Figures 1–30, 50, 51

Type species. *Tettigonia hartii* Ball, 1901: 6, by original designation.

Diagnosis. Small sharpshooters, from 3.2 to 5.7 mm in length. Overall coloration pale-yellow (Figs 2A, 4A, B, 5A, B, 8A, B), brown (Figs 1A, B, 2C) or black (Figs 2E, 6A, B), rarely reddish (Figs 23A, 30C), with pair of blackened spots behind ocelli (Figs 1A, 2A, C, E). Forewing (Fig. 1B) with only two anteapical cells, the outer one opened basally (Fig. 41H); with anteapical plexus of veins (Fig. 41J, K). Male genitalia with the stem of connective (Figs 1I, 6I, 8I) keeled and occurring as a separate sclerite, articulated anteriorly with connective arms and posteriorly with paraphysis arms. Aedeagus – anal tube connection with a lobate membrane (Fig. 44L). Aedeagus (Figs 1G, H, 6G, H, 8G, H) symmetrical, with shaft expanded dorsally; ventral margin often bearing serrated processes; apex rounded and often expanded, forming a hood-like structure. Paraphysis (Figs 1I, J, 6I, J, 8I, J) ramus long and slender, rectilinear or curved, articulated with a pair of parallel arms.

Description. ***Coloration***: Overall coloration (Figs 1A–C, 2, 6A–C, 18, 23) from pale-yellow to brown, reddish or black. Crown (Figs 1A, 2A, C, E, 6A, 18A, 23A), in dorsal view, with contrasting areas. Face (Figs 1C, 2B, D, F, 6C, 18B, 23B) with paler bands between eyes and frontogenal suture, muscular impressions distinct. Clypeus, gena and lorum as in overall coloration or paler. Pronotum (Figs 1A, 2A, C, E, 6A, 18A, 23A), in dorsal view, anterior third with distinct paler marks and darkened arched or semi-arched maculae, with posterior third smoky paler, or entirely blackened. Mesonotum (Figs 1A, 2A, C, E, 6A, 18A, 23A), in dorsal view, yellow, usually with pair of darkened triangular maculae laterally, pair of darkened rounded maculae medially, yellow or black posteriorly to transverse sulcus. Forewing veins (Figs 1A, B, 2A, C, E, 6A, 18A, 23A) distinctly paler or indistinct. Abdomen (Figs 4B, 15A, B, 24A, B), in lateral view, entirely yellow, black, reddish or yellowish ventrally and darkened dorsally. Legs (Figs 1B, 2B, D, F, 6C, 18B, 23B) yellowish, metasternum usually darkened. — ***Head and thorax***: (Figs 1A, 2A, C, E, G, 6A). Crown, in dorsal view, from slightly to moderately produced; anterior margin from broadly rounded to subtriangular, without concavities between ocelli; surface with texture slightly punctate, without fovea between eyes and ocelli, without carina on transition from crown to face. Median length of crown from 1/6 to 1/4 of transocular width, and from 2/7 to 1/2 of intraocular width. Ocelli located slightly before or aligned to imaginary line between anterior eye angles, slightly closer to adjacent eye angle than to median line. Frontogenal suture extending to crown, attaining ocelli. Antennal ledge, in dorsal view, not protuberant; in lateral view, slightly curved and oblique, not carinated. Frons, in lateral view, slightly oblique, not inflated medially; in frontal view, texture slightly punctate, muscular impressions distinct; epistomal suture complete. Clypeus, in frontal view, with apical margin rounded; in lateral view, continuing frons contour, without pubescence; Pronotum, in dorsal view, with width equivalent or slightly greater than transocular width, texture slightly rugose, without pubescence; in lateral view, dorsopleural carina complete or incomplete; in dorsal view, slightly rugose transversely anterior to transversal sulcus and smooth posteriorly. Forewing (Figs 1A, B, 2A, C, E, 6A, B, 8A, B) opaque, without sculpting; membrane indistinct; veins distinct and elevated; with only two anteapical cells, of which the outer one is open basally; with four apical cells, fourth presenting a plexus of additional veins, with basis slightly more proximal to clavus apex; appendix narrow and extending almost to third apical cell. Hind leg with femoral setal formula 2 : 1 : 0; first tarsomere shorter than combined length of two more distal tarsomeres, with two parallel longitudinal rows of small setae on plantar surface. Abdomen (Fig. 42C) sternite II with pair of small triangular inner apodemes. **Male terminalia**: Pygofer (Figs 1D, 6D, 8D), in lateral view, moderately produced, without processes; posterior margin from broadly to narrowly rounded; macrosetae distributed on entire disk; microsetae along posterior margin. Valve (Figs 1E, 6E, 8E), in ventral view, transverse and slender, anterior and posterior margins subparallel; lateral margins rounded (Fig. 1E) or acute (Fig. 6E). Subgenital plate, in ventral

view (Figs 1E, 6E, 8E), not fused to its counterpart, triangular, narrowing gradually towards apex; outer margin with uniseriate row of macrosetae and microsetae on apical third; in lateral view (Figs 1D, 6D, 8D), attaining or slightly surpassing half of pygofer. Style (Figs 1F, 6F, 8F), in dorsal view, extending posteriorly as far as connective apex; with or without preapical lobe, apex distinctly sclerotized and truncated. Connective (Figs 1F, 6F, 8F), in dorsal view, u-shaped; arms as long as wide. Stem of connective (Figs 1I, 6I, 8I) keeled, occurring as a separate sclerite, connecting anteriorly to connective and posteriorly to paraphysis arms, not well sclerotized. Aedeagus – anal tube connection, with a lobated membrane (Fig. 44L). Aedeagus (Figs 1G, 6G, 8G), symmetrical; directed posteroventrally; shaft from slightly protuberant to strongly protuberant, rarely forming lobate process on dorsal margin; ventral margin bearing or not serrated processes preapically, medially or along entire margin; apex rounded, often expanded forming a hood-like structure; in caudoventral view (Figs 1H, 6H, 8H), often compressed, apex rounded, opened medially as the gonopore exit. Paraphysis (Figs 1I, 6I, 8I), in lateral view, with pair of symmetrical short arms directed dorsally; articulated with a long slender ramus directed posterodorsally or posteroventrally; curved or rectilinear; bearing or not a conspicuously preapical constriction on ventral margin; apex (Figs 1I, J, 6I, J, 8I, J) acute or subacute. — ***Female terminalia***: Sternite VII (Figs 3A, C, 7A, C, 9A, C), in ventral view, from 1.6 to 2.2× wider than long; lateral margins subparallel, slightly rounded posteriorly; posterior margin with an acute, truncate or rounded median lobe, from nearly indistinct to strongly distinctly, on either side of which is often shallowly excavated. Pygofer (Figs 3B, 7B, 9B), in lateral view, moderately produced, posterior margin rounded; macrosetae distributed along ventral and posterior margins. First valvifer (Figs 3D, 7D, 9D) wide, broadly rounded. Valvula I (Figs 3D, E, 7, E, 9D, E) broad, almost straight; dorsal sculpted area strigate, extending from basal portion to apex; ventral sculpted area restricted to apical portion, scale-like. Valvula II (Figs 3F–H, 7F–H, 9F–H) expanded dorsally beyond basal curvature; dorsal and ventral margins rectilinear; blade with 12–18 continuous triangular or subtriangular teeth, with or without distinct gap on anterior margin of teeth and each tooth receiving one to three ducts; denticles distributed in posterior margin of teeth and on ventral and dorsal margins of apical portion; without preapical prominence on ventral margin. Gonoplac (Figs 3I, J, 7I, J, 9I, J) narrow; expanded dorsally on apical half; outer surface with tiny denticuli on apical portion, apex rounded.

Remarks. *Ciminius* specimens have resemblances in the male genitalia to *Arcanus* **gen. nov.** and *Tylozygus*, especially in the morphology of the connective, but *Ciminius* can be promptly differentiated from them and from all the Cicadellini by the forewing presenting only two anteapical cells, with the outer one opened basally, and with a plexus of veins anteapically. Amongst all the New World Cicadellini, only *Ciminius* and *Hadria* Metcalf and Bruner, 1936 presents two anteapical cells, but in the latter, both are opened basally. In addition, *Hadria* specimens present a bright colorful aspect and their distribution is restricted to Cuba, Haiti and Dominican Republic (McKamey 2007).

Species of *Ciminius* Metcalf and Bruner. The distribution is based on Young (1977), McKamey (2007), the Catálogo da Fauna Brasileira, and specimens deposited at DZUP:

C. albolineatus (Taschenberg, 1884). Argentina, Brazil (Goiás [new record], Mato Grosso [new record], Paraná [new record], Rondônia [new record], Roraima [new record], São Paulo), Bolívia, Cuba, El Salvador, French Guiana, Isle of Pines, Panama, Venezuela.
C. autumnalis **sp. nov.** Brazil (Paraná).
C. callosa (Osborn, 1926). Bolivia.
C. dissidens **sp. nov.** Brazil (Paraná).
C. hartii (Ball, 1901). Cuba, Mexico, United States (Florida, Georgia, Illinois, Indiana, Kansas, Louisiana, Mississippi, Missouri, New Mexico, Ohio, Oklahoma, Pennsylvania, Tennessee, Texas, Virginia).
C. platensis (Berg, 1879). Argentina, Brazil (Bahia [new record], Ceará [new record], Espírito Santo [new record], Mato Grosso do Sul [new record], Minas Gerais [new record], Paraná [new record], Pernambuco [new record], Piauí [new record], Rio de Janeiro, Rio Grande do Sul [new record], São Paulo), Paraguay, Peru, Venezuela.
C. sesamum **sp. nov.** Brazil (Paraná).
C. sidanus (Ball, 1936). Mexico, United States (Arizona).
C. taosus (Ball, 1936). United States (New Mexico).
C. yana Young, 1977. Argentina, Brazil (Mato Grosso do Sul, Paraná [new record], Rondônia, São Paulo [new record]).

Ciminius albolineatus (Taschenberg)

Figures 1–3, 27A–D

Tettigonia albolineata Taschenberg, 1884: 446.
Ciminius albolineatus Young, 1977: 593.

Diagnosis. Body pale yellow (Figs 1A–C, 2A, B, 27A, B), brown (Fig. 2C, D) or black (Figs 2E, F, 27C, D). Aedeagus (Fig. 1G, H) with basis of dorsal margin and apex rounded; ventral margin deeply excavated, without serrated processes. Paraphysis (Fig. 1I, J) curved ventrally, with a distinct preapical constriction on ventral margin.

Description. ***Measurements***: Total length: males (n = 20): 3.6–4.4 mm, females (n = 20): 4.0–4.6 mm. — ***Crown***: (Figs 1A, 2A, C, E, 27A, C), in dorsal view, slightly produced, anterior margin broadly rounded. Median length of crown from 1/4 to 1/2 of intraocular width, and 1/4 of transocular width. Pronotum width slightly greater than transocular width. Other features as in generic description. — ***Coloration***: Overall coloration (Figs 1A–C, 2, 27A–D) from pale-yellow to black. Crown (Figs 1A, 2A,

C, E, 27A, C), in dorsal view, with distinct paler areas. Face (Figs 1C, 2B, D, F, 27B, D) with a pale band between eyes and frontogenal suture, muscular impressions yellow, often a pale longitudinal band medially. Clypeus yellow. Gena and lorum as in overall coloration or paler. Pronotum (Figs 1A, 2A, C, E, 27A, C), in dorsal view, anterior third with distinct paler marks and darkened arched or semi-arched maculae, posterior third smoky paler. Mesonotum (Figs 1A, 2A, C, E, 27A, C), in dorsal view, yellow, usually with pair of darkened triangular maculae laterally, pair of darkened rounded maculae medially, sometimes smoky, and usually with a smoky darkened band on transverse sulcus. Forewing veins (Figs 1A, B, 2A, C, E, 27A, C) distinctly paler, rarely indistinct. Abdomen (Fig. 3B), in lateral view, yellowish ventrally and darkened dorsally. Legs (Fig. 1B) yellowish, metasternum usually darkened. Specimens with overall color black (Figs 2E, F, 27C, D), with similar marks and maculae as described in pale-yellow coloration, but sometimes less distinct, abdomen entire black and legs smoky darkened. Females very rarely black. — ***Male terminalia***: Pygofer (Fig. 1D), in lateral view, posterior margin broadly rounded. Subgenital plate (Fig. 1D), in lateral view, attaining pygofer half-length. Valve, (Fig. 1E), in ventral view, margins subparallel and lateral margins rounded. Style (Fig. 1F), in dorsal view, with preapical lobe. Aedeagus (Fig. 1G, H), in lateral view, dorsal margin of shaft from slight to broadly rounded; ventral margin excavated basally and expanded distally, without processes; apex broadly rounded. Paraphysis (Fig. 1I, J),

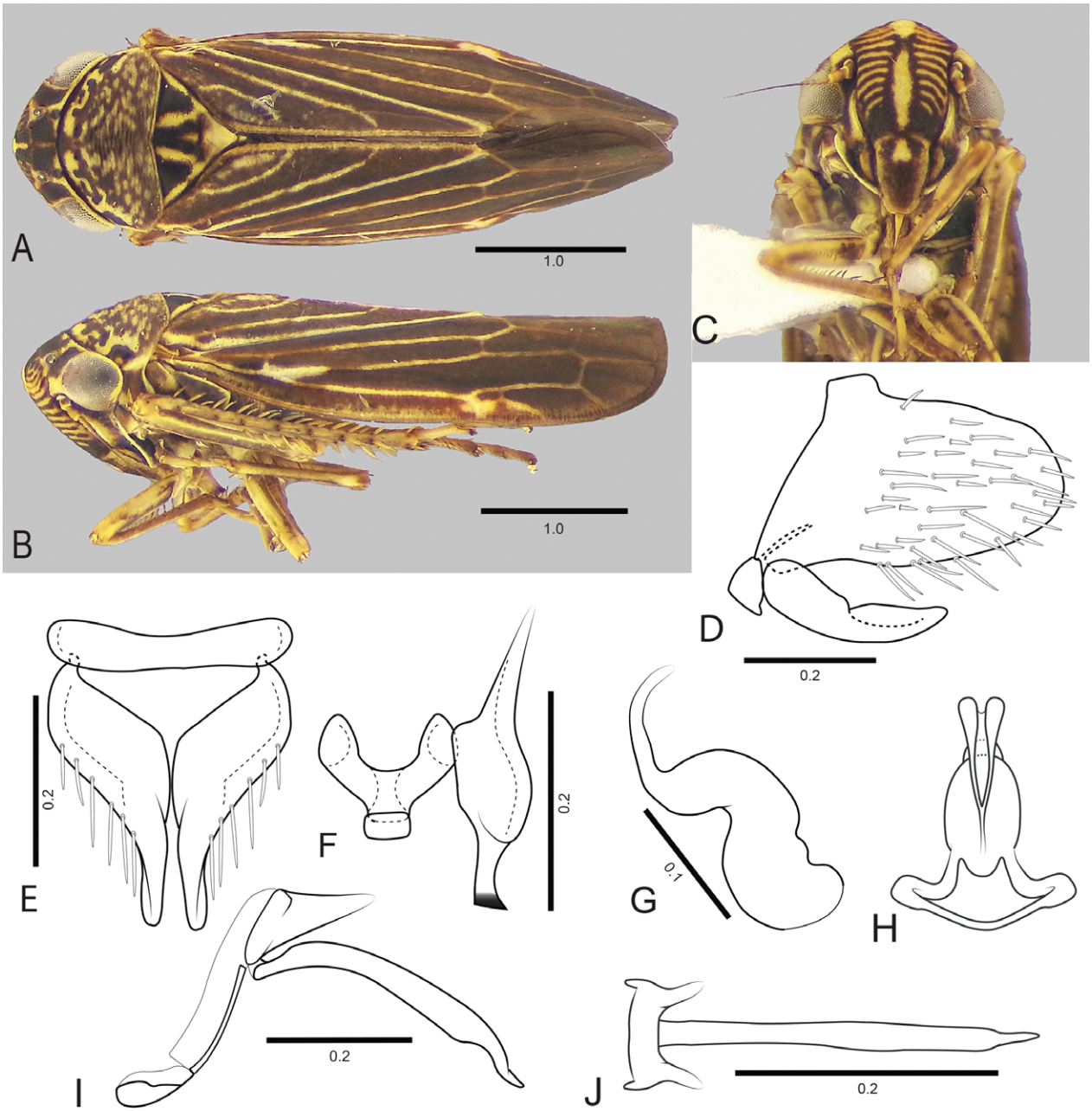

Figure 1. *Ciminius albolineatus*, male. **A** habitus, dorsal view; **B** habitus, lateral view; **C** head, frontal view; **D** pygofer, valve and subgenital plate, lateral view; **E** valve and subgenital plates, ventral view; **F** connective and style, ventral view; **G** aedeagus, lateral view; **H** aedeagus, caudoventral view; **I** connective, stem and paraphysis, lateral view; **J** paraphysis, dorsal view. Scale bars in mm.

in lateral view, curved ventrally, attaining pygofer apical third, with conspicuous preapical constriction on ventral margin and apex acute. Other features as in generic description. — ***Female terminalia***: Sternite VII (Fig. 3A–C), in ventral view, 1.8× wider than long, posterior margin with a slight median lobe. Valvula II (Fig. 3F–H) blade with 14 continuous triangular serrated teeth, without distinct gap in anterior margin of teeth. Other features (Fig. 3D, E, I, J) as in generic description.

Material examined. BRAZIL – Mato Grosso • 3♂♂, 1♀; Chapada; Nov. 1963; M. Alvarenga leg.; DZUP • 1♂, 1♀; Chapada dos Guimarães; 19 Nov. 1983; Exc. Dep. Zool. UFPR leg.; Polonoroeste; DZUP • 1♀; Cáceres; 3 Apr. 1985; C. Elias leg.; Polonoroeste; DZUP • 1♀; Diamantino; 16 Feb. 1965; S. Laroca leg.; DZUP • 16♂♂, 12♀♀; Nova Ubiratã, E.S.E.C. Rio Ronuro; 13.1122°S, 54.4436°W; 330 m; light trap; 11–16 Jun. 2017; R.R. Cavichioli & A.C. Domahovski leg.; DZUP • 1♀; same collection data as for preceding; areia rio; DZUP • 15♂♂, 22♀♀; Novo Mundo, Parque Estadual do Cristalino; 09.4517°S, 55.8396°W; 240 m; light trap; 21–25 Jun. 2017; R.R. Cavichioli & A.C. Domahovski leg.; DZUP • 1♀; same collection data as for preceding; sweep; DZUP • 1♀; 11 km south of Rio Verde; 5 Nov. 2003; Mielke & Casagrande leg.; DZUP – **Roraima** • 1♂; Tepequém, Amajari; 820 m; 14–15 Jul. 2009; O.M. Mielke & M.M. Casagrande leg.; DZUP. – **Rondônia** • 8♂♂, 6♀♀; Guaporé; 12°16’05”S, 60°42’30”W; light trap; 23 Apr. 2006; J.A. Rafael & F.F. Xavier F. leg.; DZUP. – **Paraná** • 1♂, 1♀; Foz do Iguaçu; 11 Dec. 1966; Exc. Dept. Zool. leg.; DZUP. • 1♂; Foz do Iguaçu; 3 Dec. 1966; Exc. Dept. Zool. leg.; DZUP • 2♂♂; Tibagi, Parque Estadual do Guartelá; 1000 m; 24°33’47”S, 50°15’26”W; sweep; 21–24 Feb. 2017; A.C. Domahovski leg.; DZUP • 6♂♂; Tibagi, Parque Estadual do Guartelá; 980 m; 24°33’42”S, 50°13’31”W; 11–16 Jan. 2024; A. Paladini, L. Alasmar & A.C. Domahovski leg.; DZUP • 5♂; Curitiba, Centro Politécnico, UFPR; 20–25 Jan. 2022; sweep; A.C. Domahovski & L. Alasmar leg.; DZUP • 1♂, 2♀♀; Curitiba, Centro Politécnico, UFPR; 25°26’49”S, 49°13’54”W; 925 m; 22–25 Nov. 2022; A.C. Domahovski leg.; DZUP • 3♂♂; Curitiba, Centro Politécnico, UFPR; Apr. 2023; L. Alasmar leg.; DZUP • 15♂♂, 6♀♀; Ponta Grossa, Parque Estadual de Vila Velha; 25.247579°S, 49.992188°W; 930m; sweep; 14 Dec. 2022; A.P. Pinto, A.C. Domahovski, L. Alasmar, J. Ehlert & L.P. Aguiar leg.; DZUP. **São Paulo** • 1♂, 1♀; São José do Barreiro, Parque Nacional da Serra da Bocaina, near lodging; 22.733757°S, 44.616643°W; 1522 m; sweep; 9–11 Jan. 2023; A.P. Pinto, A.C. Domahovski, J. Ehlert & L.P. Aguiar leg.; DZUP.

Remarks. Specimens of *C. albolineatus* and *C. platensis* are the most abundant species amongst all studied spec-

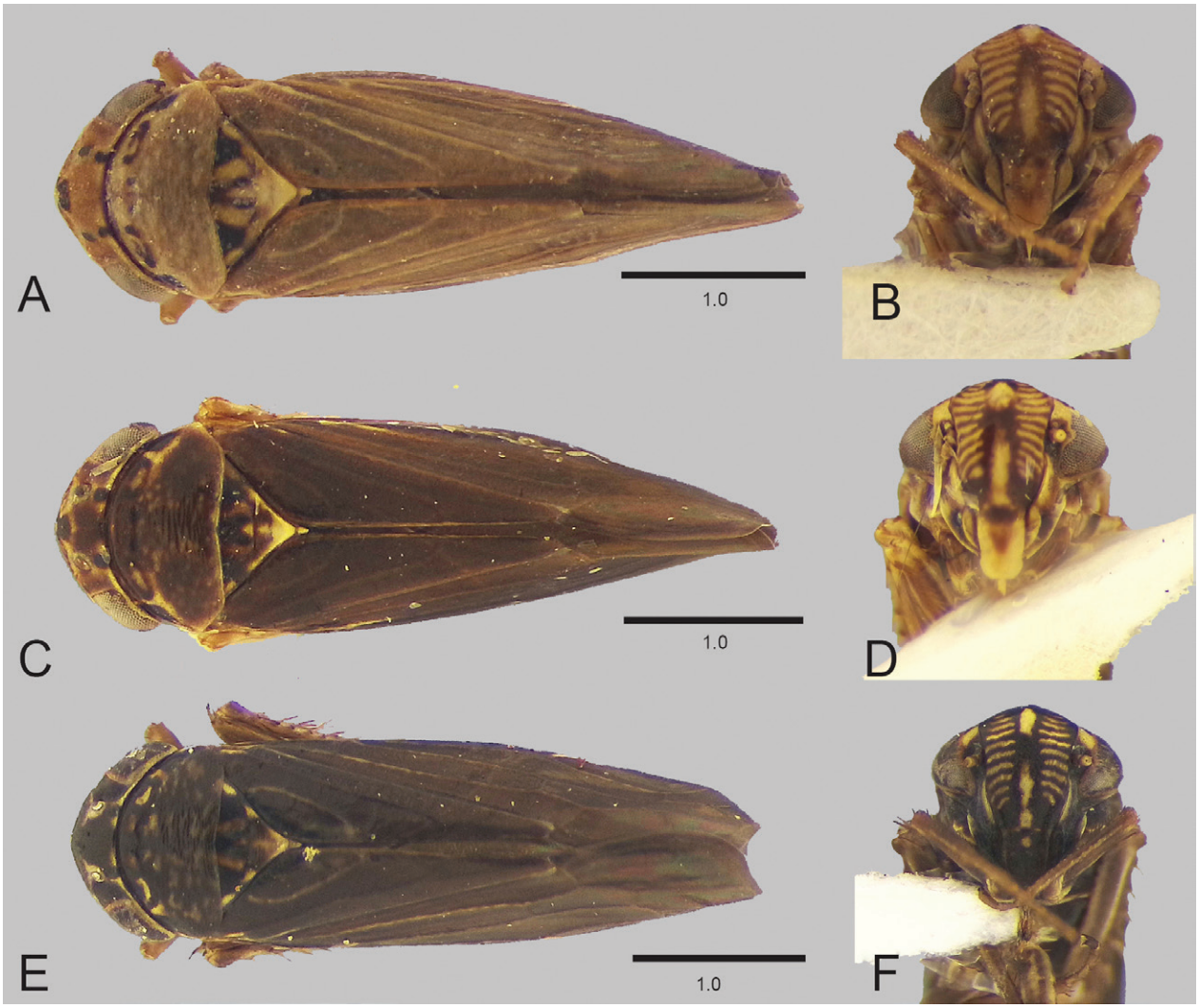

Figure 2. *Ciminius albolineatus* color variation in males, habitus in dorsal view (left) and frontal view (right). **A**, **B** specimen from Mato Grosso. **C**, **D** specimen from Rondônia. **E**, **F** specimen of Paraná. Scale Scale bars in mm.

imens, and have external resemblances to each other, but they can be differentiated by the male genitalia characters presented in the former as: aedeagus with ventral margin lacking processes and paraphysis curved ventrally, with ventral margin bearing a preapical constriction. The specimens of *C. albolineatus* collected in "Centro Politécnico, UFPR, Curitiba, Paraná" and "Parque Estadual Vila Velha, Ponta Grossa, Paraná" presented a great number of males and a few females with black coloration. Even when specimens are black, they present the forewings

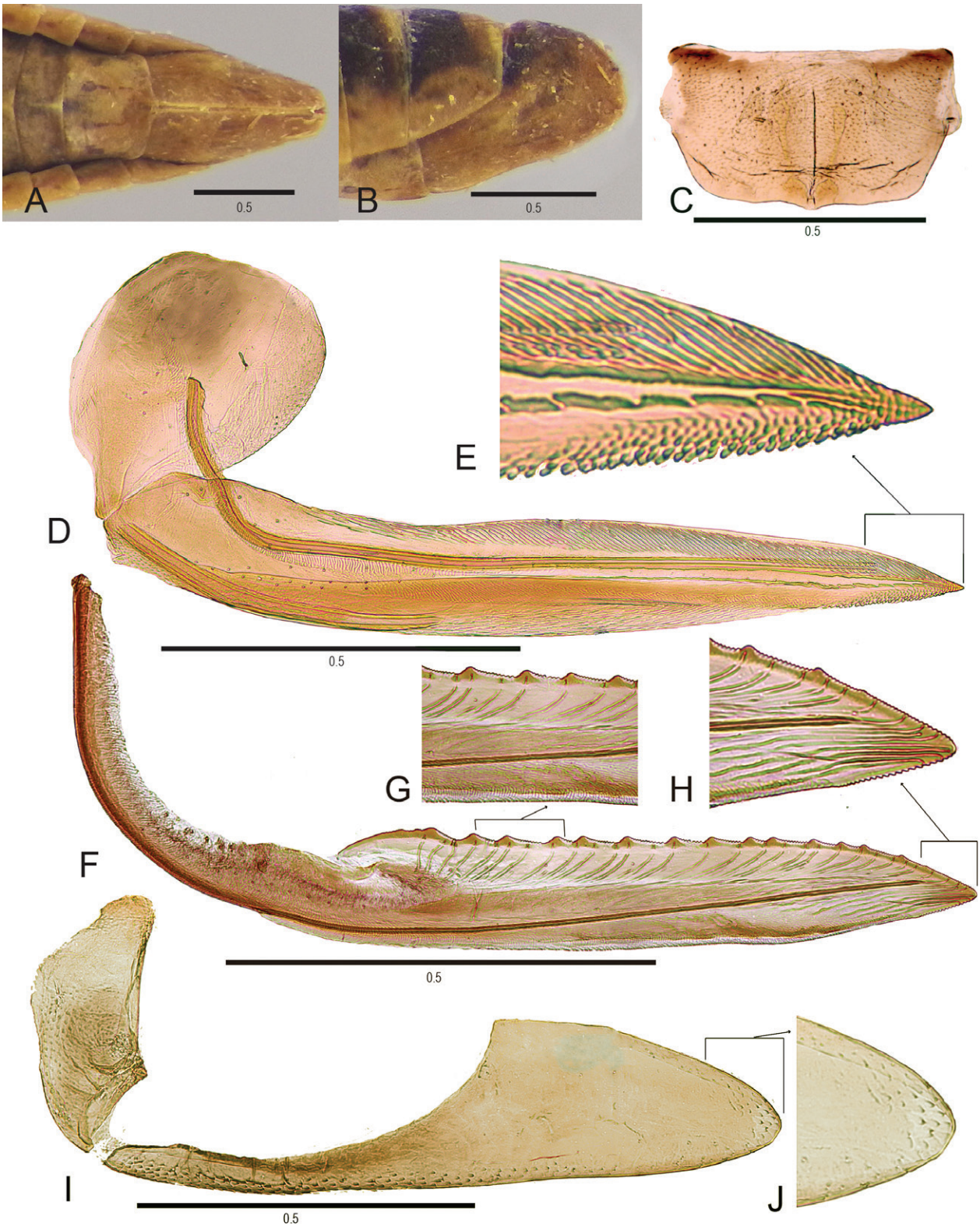

Figure 3. *Ciminius albolineatus*, female. **A** distal portion of abdomen, ventral view; **B** distal portion of abdomen, lateral view; **C** sternite VII, ventral view; **D** first valvifer and first valvula, lateral view; **E** apical portion of first valvula; **F** second valvula, lateral view; **G** median portion of second valvula; **H** apical portion of second valvula; **I** second valvifer and gonoplac, lateral view; **J** apical portion of gonoplac. Scale bars in mm.

with veins paler, unlike the other black specimens of *Ciminius*, like *C. hartii*, *C. dissidens* **sp. nov.**. males, and *C. sesamum* **sp. nov.** which present the veins mostly concolor with the membrane. Until the present moment, this species presents the only occurrence of black females for the genus.

Ciminius callosa (Osborn)

Figure 4

Cicadella callosa Osborn, 1926: 179.
Ciminius callosa Young, 1977: 593.

Diagnosis. Overall coloration (Fig. 4A, B) pale-yellow. Crown, face and pronotum anterior third (Fig. 4A) with distinct brownish areas. Forewings (Fig. 4A, B) brownish, with paler veins. Abdomen (Fig. 4C) yellow, with darkened areas. Female abdominal sternite VII (Fig. 4C) wider than long, with lateral margins slightly rounded posteriorly and with a slightly rounded median lobe.

Description. ***Coloration***: Overall coloration (Fig. 4A, B) pale-yellow. Crown (Fig. 4A), in dorsal view, with distinct brownish areas. Face (Fig. 4C) with a brownish band between eyes and frontogenal suture, muscular impressions yellow, often a pale longitudinal band medially. Pronotum (Fig. 4A), in dorsal view, anterior third with distinct darker marks and a darkened arched or semi-arched maculae, posterior third smoky brown. Mesonotum (Fig. 4A), in dorsal view, yellow, usually with a pair of darkened triangular maculae laterally, a pair of darkened rounded maculae medially. Forewing (Fig. 4A, B) brownish, with veins distinctly paler. Abdomen (Fig. 4C), in ventral view, yellowish ventrally with darkened areas. Legs (Fig. 4B, C) yellowish, metasternum slightly darker. — ***Male***: Unknown. — ***Female genitalia***: Sternite VII (Fig. 4C), in ventral view, wider than long; lateral margins subparallel, slightly rounded posteriorly; posterior margin with a slight and rounded median lobe.

Material examined. ***Holotype***: BOLIVIA • ♀; Puerto Suarez; 150 m; J. Steinbach leg.; CMNH-IZ 724,504; CMNZ.

Remarks. *Cicadella callosa* was described based on a female holotype analyzed herein, and a female paratype, both from Bolivia. In the original description, a male allotype was designed, from Bom Fin, probably misspelled from the municipality of Bonfim, in Salvador, Bahia State, Brazil. Young (1977) transferred *Cicadella callosa* to *Ciminius*, reporting the close assemblance of the female abdominal sternites VII of *C. callosa* holotype and his illustration of *C. platensis*. The overall coloration of *C. callosa* holotype is similar to any other *Ciminius* representant, except *C. dissidens* **sp. nov.** and the black form females of *C. albolineatus*. Compared to the original description, the male allotype from Bahia overall coloration is similar to any other pale-yellow male found in the genus. The male genitalia capsule of *C. callosa* allotype was illustrated only externally in ventral view, originally described without any useful features that could be used for its identification. After the original work, in 1926, no other representative of this species was reported.

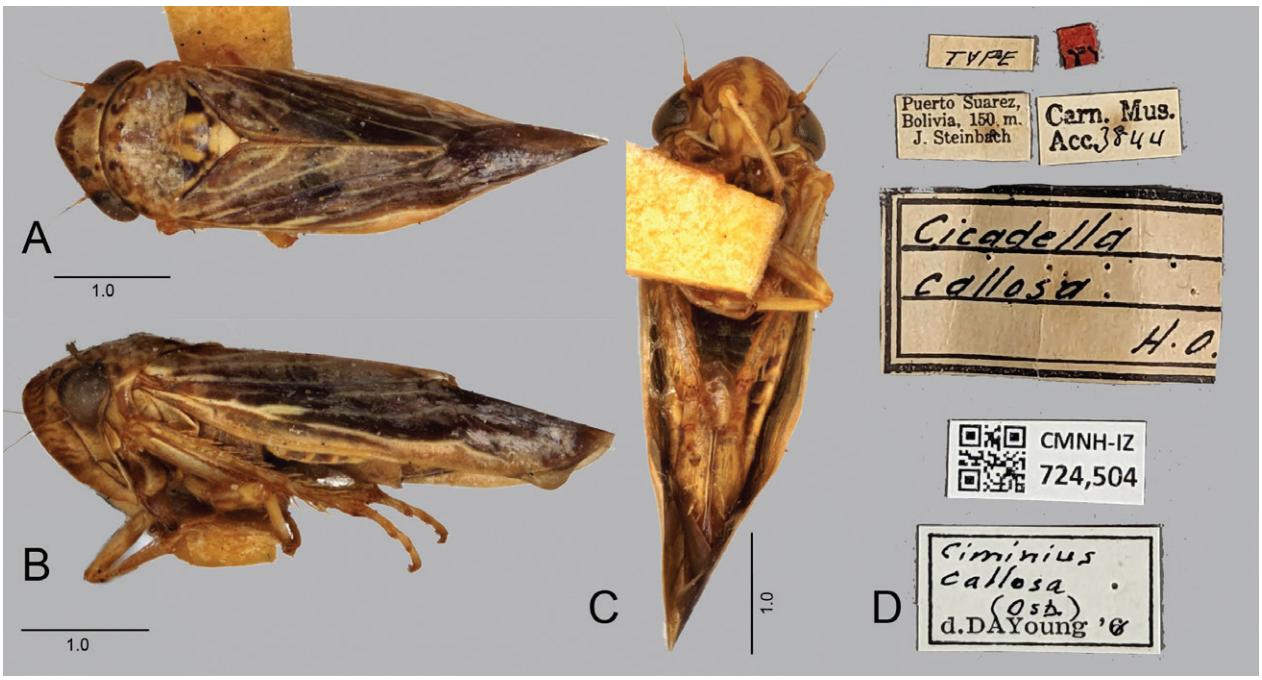

Figure 4. *Ciminius callosa*, holotype female. **A** habitus, dorsal view; **B** habitus, lateral view; **C** habitus, ventral view; **D** labels. Scale bar in mm.

Ciminius hartii (Ball)

Figures 5–7, 28E, F

Tettigonia hartii Ball, 1901: 61.
Ciminius hartii Metcalf and Bruner, 1936: 944.

Diagnosis. Coloration of males (Fig. 6A, B) black and females (Figs 5A, B, 28E) pale-yellow. Males (Fig. 6A) usually without yellowish marks on crown and pronotum, if present, restrict to pronotum anterior margin. Aedeagus (Fig. 6G, H) ventral margin expanded, not excavated basally and without processes; apex expanded forming a hood-like structure. Paraphysis (Fig. 6I, J) directed posterodorsally, rectilinear.

Description. ***Measurements***: Total length: males (n = 3) 3.9–4.1 mm; females (n = 3) 5.1–5.3 mm. — **Crown**: (Figs 5B, 6A, 28E), in dorsal view, slightly produced, anterior margin subtriangular. Median length of crown from 2/5 to 1/2 of intraocular width, and 1/4 of transocular width. Pronotum width approximately equal to transocular width. Ocelli located slightly posteriorly of imaginary line between anterior eyes angles. Other features as in generic description. — **Coloration**: Females, with overall coloration pale-yellow (Figs 5A, 28E, F), similar to described in *C. albolineatus*. Males black (Fig. 6A–C). Crown and pronotum (Fig. 6A) entirely black. Face (Fig. 6C) with yellow areas on muscular impressions. Clypeus, gena and lorum yellowed. Mesonotum (Fig. 6A) black. Forewings (Fig. 6A, B) veins concolor, indistinct. Legs (Fig. 6B) yellow. Abdomen, in lateral view, blackened, bordered with yellow. — ***Male terminalia***: Pygofer (Fig. 6D), in lateral view, posterior margin broadly rounded. Subgenital plate (Fig. 6D), in lateral view, slightly surpass half of pygofer. Valve (Fig. 6E), in ventral view, margins subparallel, lateral margins acute anteriorly. Style (Fig. 6F), in dorsal view, with a slight dentate process medially in outer margin. Aedeagus (Fig. 6G, H), in lateral view, shaft protuberant dorsally; ventral margin rugulose anteriorly; apical portion expanding to a rounded apex. Paraphysis (Fig. 6I), in lateral view, directed posterodorsally, rectilinear, reaching pygofer apical third; dorsal and ventral margins subparallel, slightly constricted subapically; apex acute; in dorsal view (Fig. 6J), sinuous preapically. Other features as in generic description. — **Female genitalia**: Sternite VII (Figs 5D, 7A–C), in ventral view, almost 2× wider than long, posterior margin with a distinctly acute median lobe. Valvula II (Fig. 7F–H) blade with 19 continuous subtriangular serrated teeth. Other features (Fig. 7D, E, I, J) as in generic description.

Material examined. Lectotype (Fig. 4): UNITED STATES OF AMERICA – **Mississippi** • 1♀; 1945; Oman leg.; USNMENT 01513860; USNM.

Other material. UNITED STATES OF AMERICA – **Florida** • 1♂, 1♀; Hudson; 13 Jul. 1939; Oman leg.; USNM • 1♂; Dunellon 7 Oct. 1938; Oman leg.; USNM • 1♂; New Port Ritchey; 7. Oct. 1938; Oman leg.; USNM • 1♀; Sof Picnic; 8 Oct. 1938; Oman leg.; USNM • 1♀; Sanford; 22 July. 1939; Oman leg.; USNM.

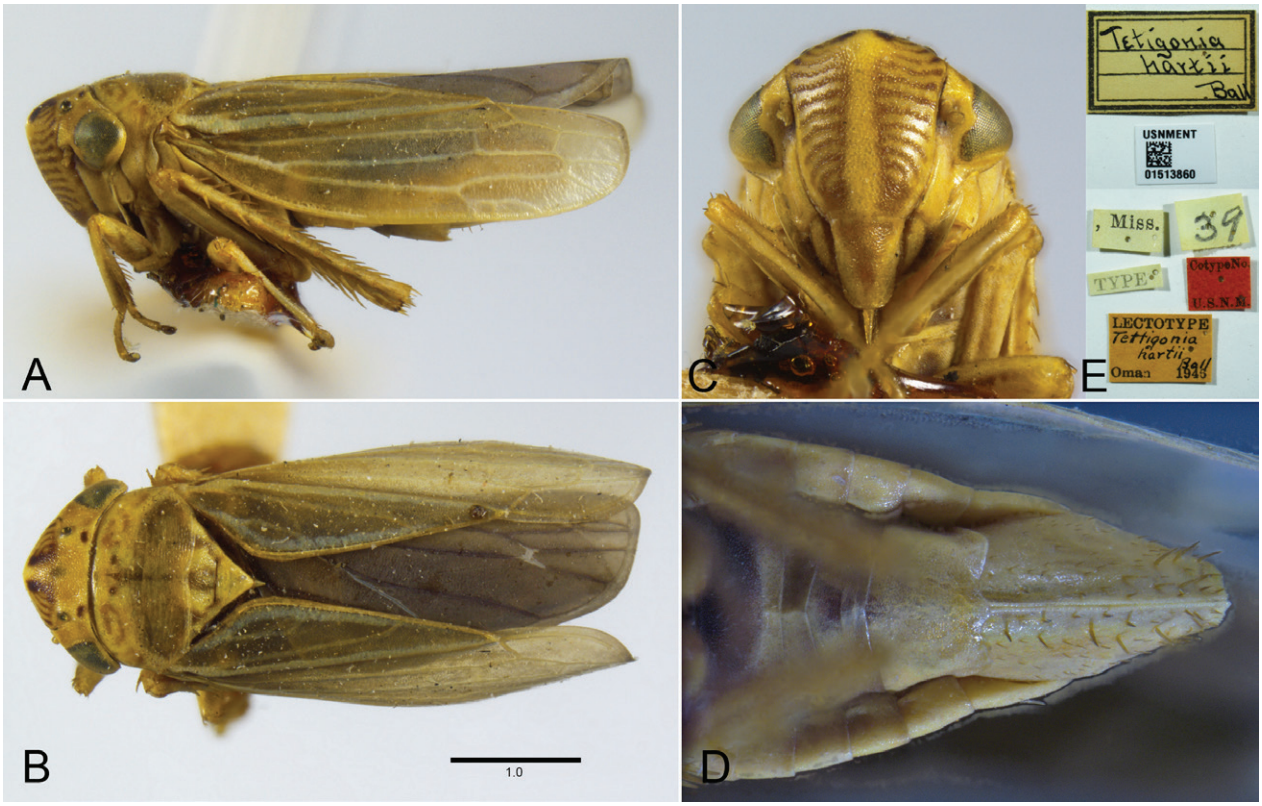

Figure 5. *Ciminius hartii*, lectotype female. **A** habitus, lateral view; **B** habitus, dorsal view; **C** head, ventral view; **D** genital capsule, ventral view; **E** labels. Scale bar in mm.

Remarks. *Ciminius hartii* resembles externally to *C. yana*, *C. sesamum* **sp. nov.**, and males of *C. dissidens* **sp. nov.**., but differs from them by the aedeagus not presenting any lobated process on dorsal margin nor serrated processes on ventral margin. Otherwise, the paraphysis is rectilinear, unlikely in *C. yana* and *C. dissidens* **sp. nov.**. *Ciminius hartii* is the most abundant species amongst Nearctic *Ciminius* reported in literature and in museum collections.

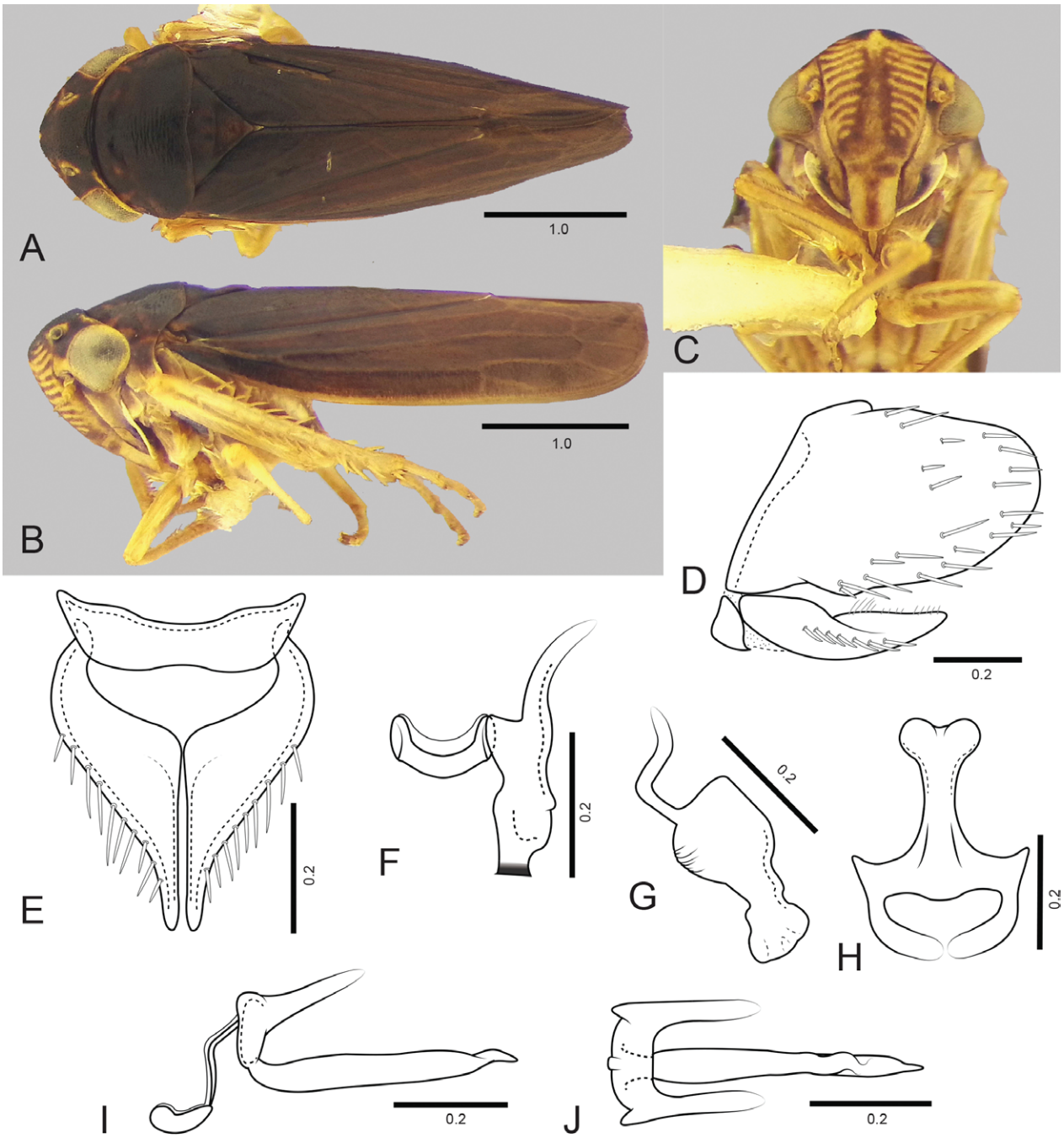

Figure 6. *Ciminius hartii*, male. **A** habitus, dorsal view; **B** habitus, lateral view; **C** head, frontal view; **D** pygofer, valve and subgenital plate, lateral view; **E** valve and subgenital plates, ventral view; **F** connective and style, ventral view; **G** aedeagus, lateral view; **H** aedeagus, caudoventral view; **I** connective, stem and paraphysis, lateral view; **J** paraphysis, dorsal view. Scale bars in mm.

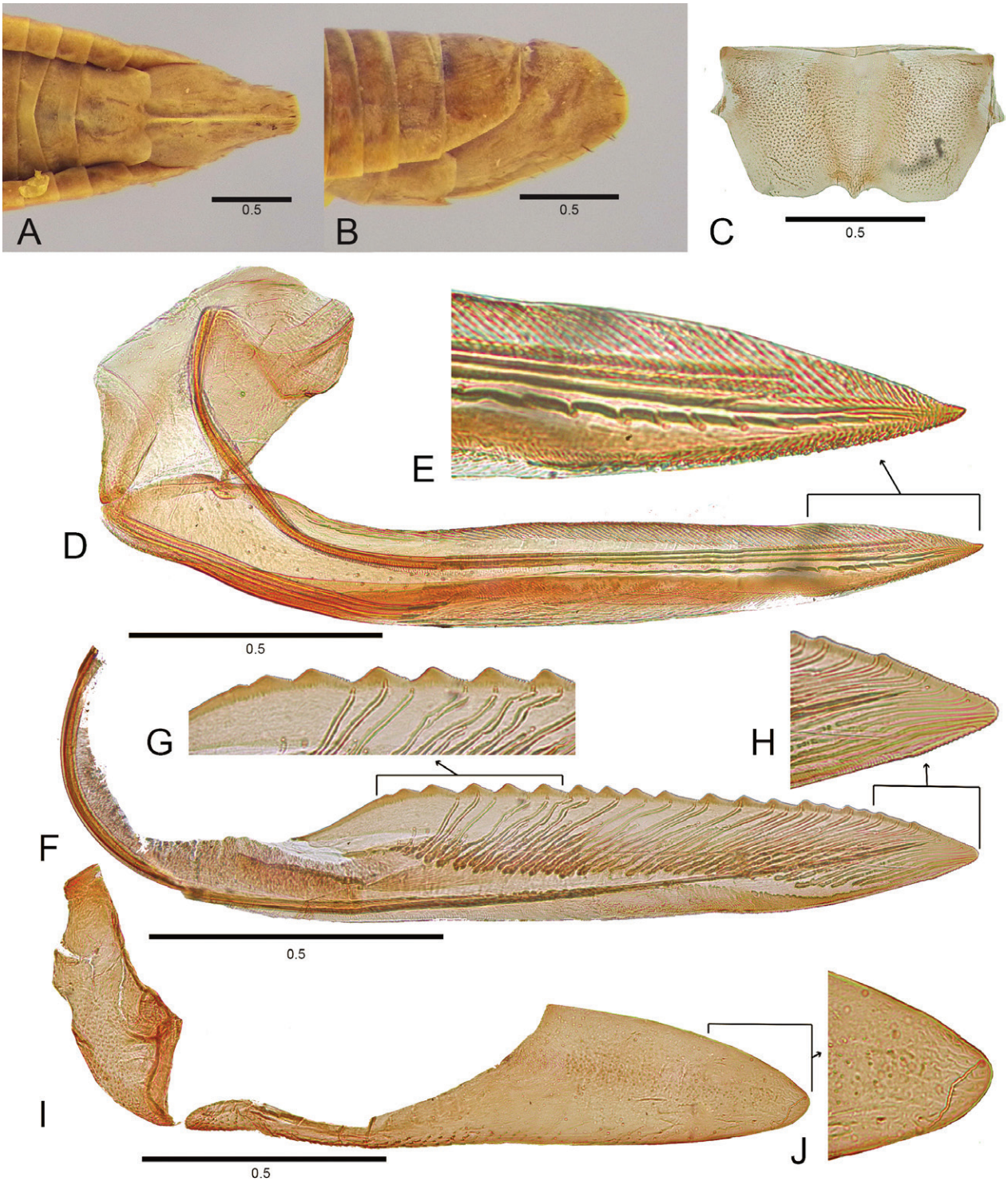

Figure 7. *Ciminius hartii*, female. **A** distal portion of abdomen, ventral view; **B** distal portion of abdomen, lateral view; **C** sternite VII, ventral view; **D** first valvifer and first valvula, lateral view; **E** apical portion of first valvula; **F** second valvula, lateral view; **G** median portion of second valvula; **H** apical portion of second valvula; **I** second valvifer and gonoplac, lateral view; **J** apical portion of gonoplac. Scale bars in mm.

Ciminius platensis (Berg)

Figures 8, 9, 28G, H, 50A, B

Acocephalus dubius Berg, 1879: 259.
Tettigonia dubia nomen nudum Berg, 1884: 162.
Tettigonia platensis Berg, 1884: 162.
Ciminius platensis Young, 1977: 593.

Diagnosis. Coloration pale-yellow (Figs 8A–C, 28G, H). Aedeagus (Fig. 8G, H) bearing from two to three large teeth on median third of ventral margin, apex expanded, broadly rounded, forming a hood-like structure. Paraphysis (Fig. 8I) almost rectilinear in lateral view, directed posterodorsally, apex acute; in dorsal view (Fig. 8J), broad at base, strongly narrowing towards apex.

Description. ***Measurements***: Total length: males (n = 20) 4.0–4.6 mm, females (n = 20) 4.5–5.5 mm. — ***Crown***: (Figs 8A, 28G), in dorsal view, slightly produced, anterior margin from broadly rounded to subtriangular; median length of crown from 3/8 to 1/2 of intraocular width, and about 1/4 of transocular width. Pronotum width slightly greater than transocular width. Ocelli aligned to imaginary line between anterior eye angles. Other features as in generic description. — ***Coloration***: Overall coloration pale-yellow (Figs 8A–C, 28G, H), as described for *C. albolineatus*. — ***Male terminalia***: Pygofer (Fig. 8D), in lateral view, posterior margin from broadly to narrowly rounded. Subgenital plate (Fig. 8D), in lateral view, slightly exceeding posteriorly half-length of pygofer. Valve (Fig. 8E), in ventral view, anterior and posterior margins subparallel; lateral margins narrowly rounded anteriorly. Style (Fig. 8F), in dorsal view, without preapical lobe. Aedeagus (Fig. 8G, H), in lateral view, shaft expanded on basal half, ventral margin bearing two or three large teeth medially, apical portion expanded, apex rounded, forming a hood-like structure. Paraphysis (Fig. 8I, J), in lateral view, directed posterodorsally, rectilinear, dorsal and ventral margins subparallel, not attaining pygofer apical third, apex acute. Other features as in gener-

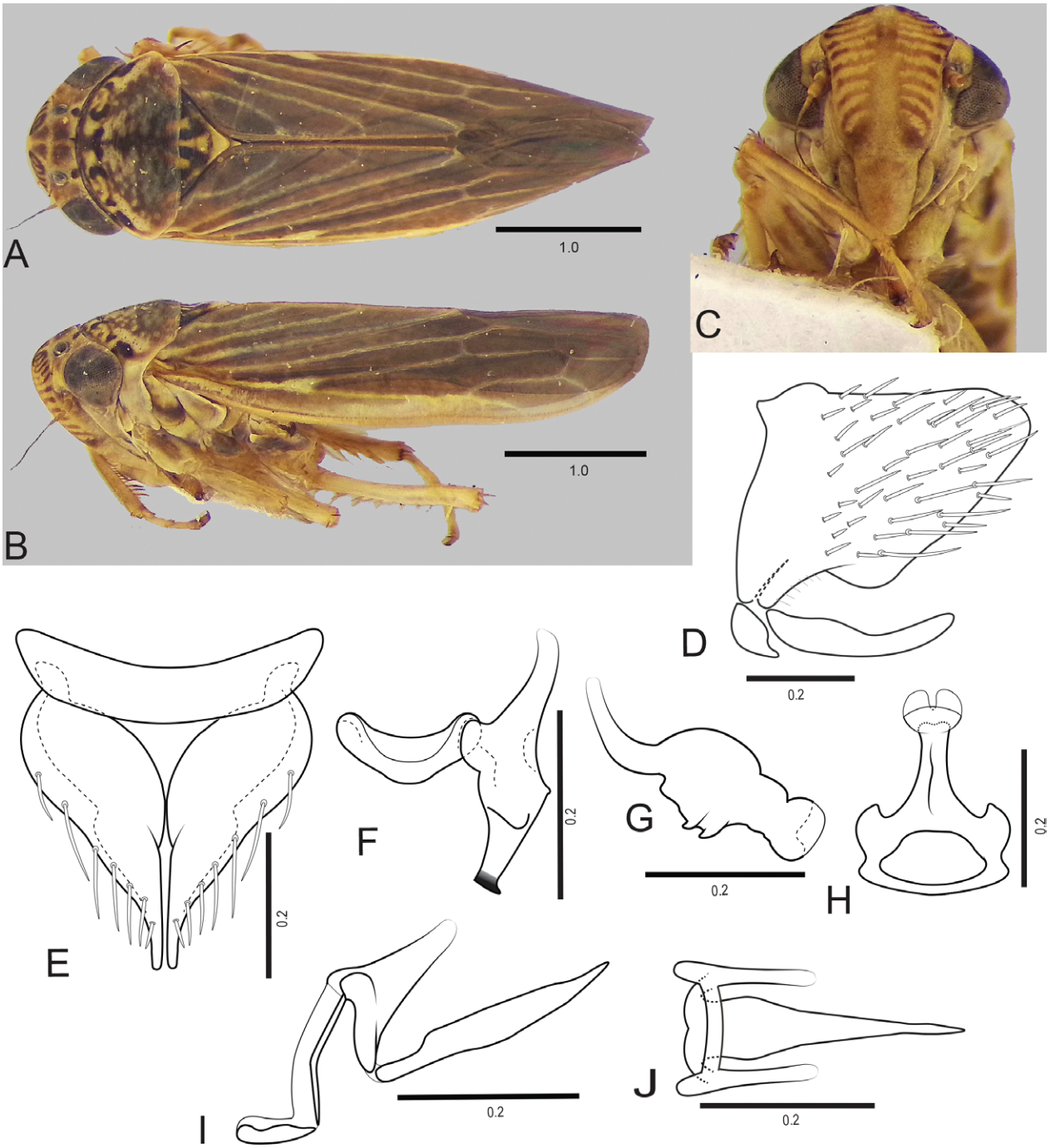

Figure 8. *Ciminius platensis*, male. **A** habitus, dorsal view; **B** habitus, lateral view; **C** head, frontal view; **D** pygofer, valve and subgenital plate, lateral view; **E** valve and subgenital plates, ventral view; **F** connective and style, ventral view; **G** aedeagus, lateral view; **H** aedeagus, caudoventral view; **I** connective, stem and paraphysis, lateral view; **J** paraphysis, dorsal view. Scale bars in mm.

ic description. — ***Female terminalia***: Sternite VII (Fig. 9A–C), in ventral view, 1.6× wider than long, posterior margin with a slight median lobe. Valvula II (Fig. 9F–H) blade with 12 continuous triangular serrated teeth, with a distinct gap in anterior margin of teeth. Other features (Fig. 9D, E, I, J) as in generic description.

Material examined. BRAZIL – **Rio Grande do Sul** • 1♂; Areias Brancas, Torres; Fev.1983; K. Zanol leg.; DZUP • 3♀♀; Águas Belas, Viamão, 3–4 Mar.1980; K. Zanol leg.; DZUP • 1♂; Santa Maria, UFSM; 29°43'02.2"S, 53°43'07"W; 08 Fev. 2023; C.V. Rodrigues, F.D. Souza, G. Flores leg.; DZUP. – **Paraná** • 6♂, 6♀ Curitiba, Mar. 1983, Cavichioli leg.; DZUP • 2♂♂, 2♀♀; same collection data as for preceding; Sakakibara leg.; DZUP • 1♂, 7♀♀ same collection data as for preceding; A.M.S. e R.R.C. leg.; DZUP • 1♂, 1♀ same collection data as for preceding; Mar. 1982; Sakakibara leg.; DZUP • 1♂; Piraquara, Mananciais da Serra; 25°29'47"S, 48°58'54"; 1021 m; 20 Feb. 2022; A.P. Pinto, J. Ehlert

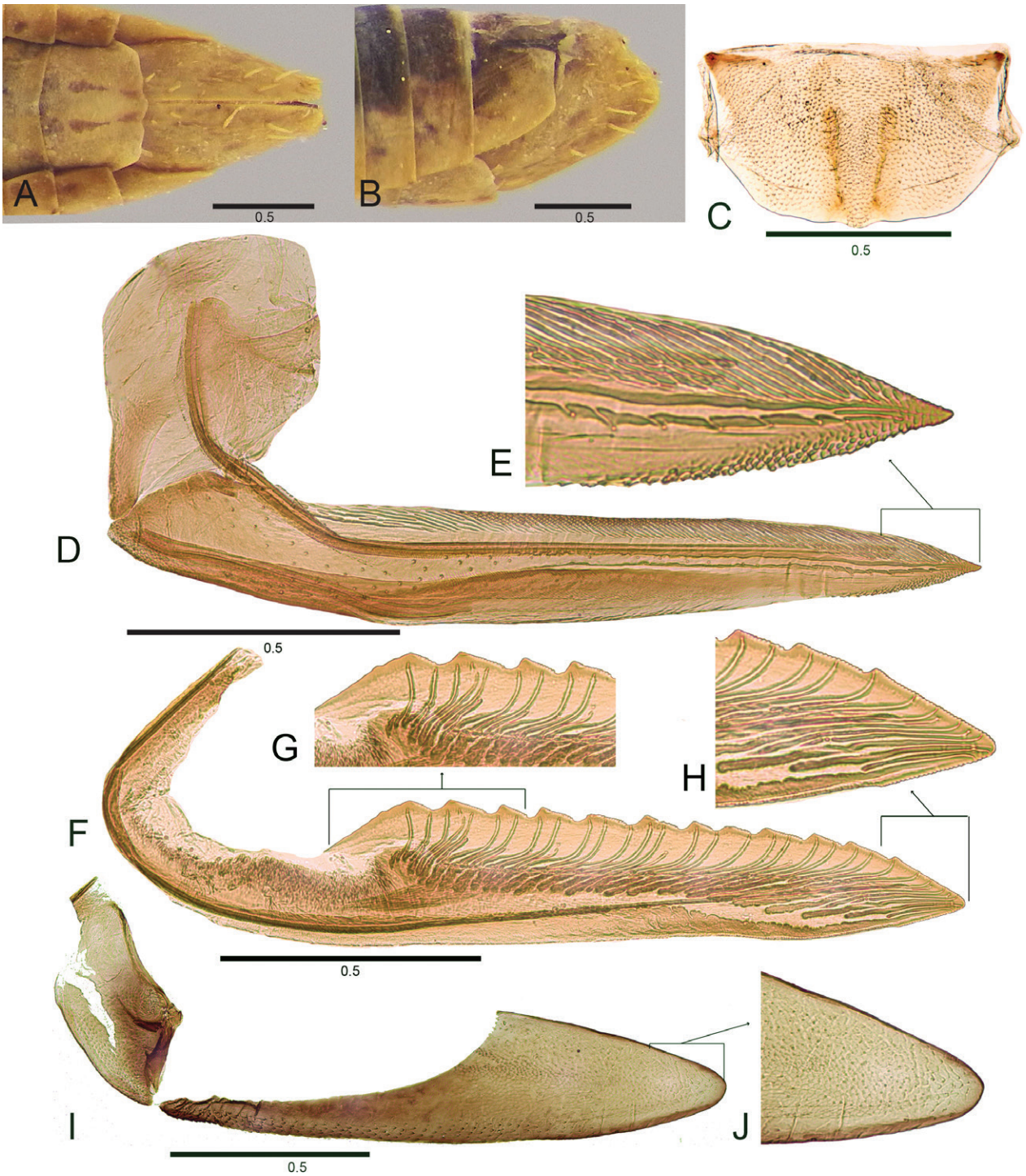

Figure 9. *Ciminius platensis*, female. **A** distal portion of abdomen, ventral view; **B** distal portion of abdomen, lateral view; **C** sternite VII, ventral view; **D** first valvifer and first valvula, lateral view; **E** apical portion of first valvula; **F** second valvula, lateral view; **G** median portion of second valvula; **H** apical portion of second valvula; **I** second valvifer and gonoplac, lateral view; **J** apical portion of gonoplac. Scale bars in mm.

& L. Polizeli leg.; DZUP • 2♂♂, 2♀♀; Curitiba, Centro Politécnico, UFPR, grasslands fields near Biológicas Departament; 20–25 Jan. 2022; Sweep; A.C. Domahovski & L. Alasmar; DZUP • 2♂♂, 2♀♀; Diamante do Norte, E.E. Caiuá; 14 Dec. 2012; M. Savaris & S. Lampert leg.; Luiz de Queiroz trap; DZUP • 1♂, 7♀♀; Umuarama; Feb. 1986, A.F. Yamamoto leg.; DZUP • 1♂, 1♀; Porecatu; 20 Oct. 1970, Becker-Hatschback leg.; DZUP • 1♂, 9♀; Ponta Grossa, P.E. Vila Velha; 25.247579°S, 49.992188°W; 930 m; 14 Dec. 2022, A.P. Pinto, A.C. Domahovski, L. Alasmar, J. Ehlert & L.P. Aguiar leg.; Sweep; DZUP • 8♂♂, 1♀; São José dos Pinhais; 25°36'18''S, 49°11'37''W; 880 m; 06 May 2023; A.C. Domahovski leg.; sweep; DZUP • 3♂♂, 1♀; Tuneiras do Oeste, REBIO das Perobas; 01–04 APr. 2024; A.C. Domahovski & L. Alasmar; sweep; DZUP. – **Espírito Santo** • 1♂; Linhares, Res. Vale Rio Doce, main station; 19.0905°S, 40.0410°W; 56 m; 07 May 2007; J.A. Rafael & F.F. Xavier F. leg.; light; DZUP • 1♂, 3♀♀; Linhares; Sep. 1972; M. Alvarenga, leg.; DZUP. – **Minas Gerais** • 2♂♂, 4♀♀; Águas Vermelhas; Dec. 1983; M. Alvarenga leg.; DZUP • 2♂♂, 12♀♀; São Gonçalo Rio Abaixo, Estação Ambiental Peti-Cemig; 15 Apr. 2013; 19°53'02"S, 43°22'21"W; A. Lima, A.F. Kumagai & P. Dias leg.; light; DZUP • 1♀; Lavras, Campus UFLA, 16–18 Sep. 2013, ~905 m, 21°13'50"S, 44°58'32"W, M.N. Morales leg.; Malaise; DZUP. – **Mato Grosso do Sul** • 3♂♂, 5♀♀; Porto Murtinho; 07 Dec. 2012; M. Savaris & S. Lampert leg.; light trap; DZUP. – **Alagoas** • 1♂ Jacaré dos Homens; 9.662725°S, 37.233245°W, Jun. 2024, S. Cajé & J. Duarte-De-Mélo leg; light; DZUP. – **Bahia** • 1♂, 11♀♀ Encruzilhada; Nov. 1974; 980 m; Alvarenga leg.; DZUP • 4♀♀; same collection data as for preceding; Dec. 1980; DZUP • 4♀♀; Senhor do Bonfim, Serra Santana; 10.23223°S, 40.1159°W; 520 m; 15 May 2007; J.A. Rafael & F.F. Xavier F., light; DZUP. – **Ceará** • 35♂♂, 27♀♀; Cratéus, RPPN Serra das Almas; 5.11°S, 40.87°W; 320 m; 18 Apr. 2014; Melo & Rosa; light trap; DZUP • 2♂♂, 1♀; same collection data as for preceding; 22 May 2014; DZUP • 3♂♂, 18♀♀; same collection data as for preceding; 4.8107°S, 38.9740°W; 220 m; 15 May 2014; DZUP • 2♂♂; Ubajara, PN de Ubajara, Park entry; 3°50'18,00"S, 40°53'54,00"W; 849 m; 23 Apr. 2012; Câmara, J.T. leg.; light trap; DZUP. – **Paraíba** • 4♂♂, 1♀; Mamanguape, Reserva Biológica Guaribas; 6.7421°S, 35.1426°W; 13–16 May 2023, A. Martins & G. Celante leg.; light trap; DZUP • 2♂♂, 5♀♀; same collection data as for preceding; sweep; DZUP • 1♂, 5♀♀; Pocinhos, Caatinga Km230, 7.1437°S, 36.1357°W; 15 May 2023; A.L. Martins leg.; sweep; DZUP. – **Pernambuco** • 3♂♂, 10♀; Afrânio; 08.3153°S, 41.0259°W; 550 m; 16 May 2007; J.A. Rafael & F.F. Xavier F. leg.; Manual; DZUP. – **Piauí**: 2♂♂, 9♀♀; Ubajara; 03°50'77"S, 40°53'53"W; 846 m; 22 Apr. 2012, R.R. Cavichioli leg.; light; DZUP • 1♀; Coronel José Dias, P.N. Serra da Capivara; 590 m; 08°44'3.89"S, 42°30'10.56"W; 08–12 Mar. 2016, R.M. Feitosa, G.P. Camacho & F.O. Marfins leg.; DZUP • 1♂; Piracuruca, PN de Sete Cidades, dormitory; 4°5'57,00"S, 41°42'34,00"W; 193 m; 18–19 Apr. 2012; Takiya, D.M. leg.; light; DZUP. – **São Paulo** • 5♂♂, 1♀; Marília; 22.18927°S, 49.92630°W; 18–20 Nov. 2022; L. Alasmar leg.; sweep; DZUP • 2♂♂ same collection data as for preceding; 22.19384°S, 49.92172°W; DZUP • 2♂♂; same collection data as for preceding; Condomínio Green Valley; 22.16342°S, 50.00271°W; 07 Jan. 2023; DZUP.

Remarks. *Ciminius platensis* is a common species collected with sweeping net in open field grasses, and along with *Ciminius autumnalis* **sp. nov.** and *C. sidanus*, do not present male black specimens known. *Ciminius platensis* can be differentiated from the latter securely due to the aedeagus with few and large teeth ventrally and paraphysis rectilinear and short.

Ciminius sidanus (Ball)

Figures 10–12, 29A, B

Cicadella sidana Ball, 1936: 21.
Ciminius sidanus DeLong and Knull, 1946a: 17.

Figure 10. *Ciminius sidanus*, holotype female and allotype male. **A** habitus lateral view, female holotype above, male allotype below; **B** female holotype habitus, dorsal view; **C** head, frontal view; **D** female holotype genital capsule, ventral view; **E** labels. Scale bar in mm.

Diagnosis. Coloration pale-yellow (Figs 10A, B, 11A, B, 29A), with longitudinal paler stripes on forewings and orangish marks on pronotum and mesonotum anterior thirds. Aedeagus (Fig. 11G, H) ventral margin with slightly rugosities preapically, shaft expanded, apical portion not expanded, apex rounded. Paraphysis (Fig. 11I, J) directed posterodorsally, rectilinear, dorsal and ventral margins subparallel.

Description. ***Measurements***: Total length: males (n = 3) 3.8–4.0 mm; females (n = 3) 4.6–5.0 mm. — ***Head and thorax***: Crown (Figs 10B, 11A, 29A), in dorsal view, slightly produced, anterior margin subtriangular or rounded. Median length of crown from 1/4 to 1/2 of intraocular width, and from 1/4 to 1/3 of transocular width. Pronotum width approximately equal to transocular width. Ocelli located slightly posteriorly of imaginary line between anterior eyes angles. Other features as in generic description. — ***Coloration***: Overall coloration yellow. Crown (Figs 10B, 11A–C, 29A, B) with pair of small black spots at apex. Frons (Figs 10C, 11C, 29B) with darker areas on muscular impressions. Pronotum (Figs 10B, 11A, 29A)

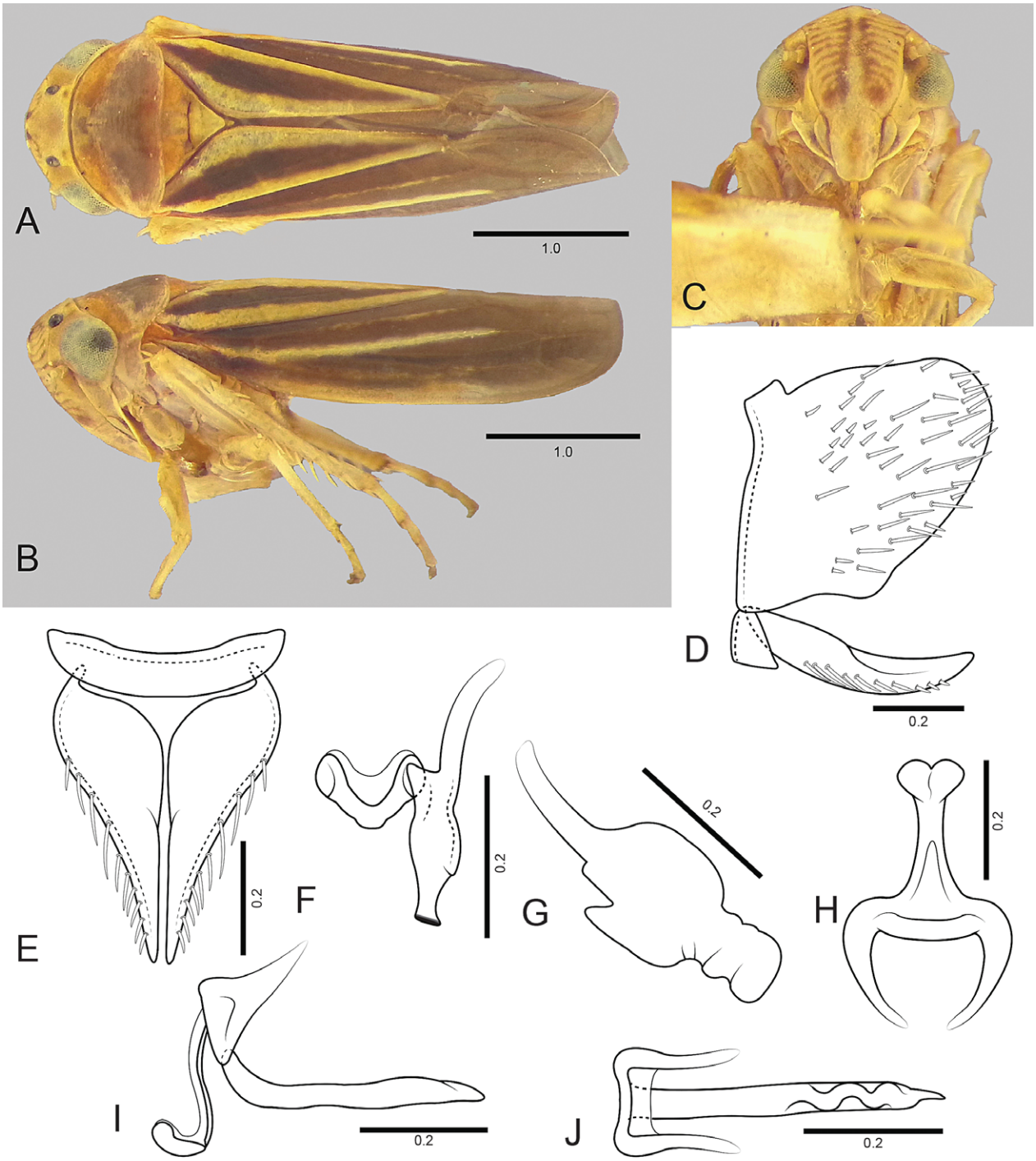

Figure 11. *Ciminius sidanus*, male. **A** habitus, dorsal view; **B** habitus, lateral view; **C** head, frontal view; **D** pygofer, valve and subgenital plate, lateral view; **E** valve and subgenital plates, ventral view; **F** connective and style, ventral view; **G** aedeagus, lateral view; **H** aedeagus, caudoventral view; **I** connective, stem and paraphysis, lateral view; **J** paraphysis, dorsal view. Scale bars in mm.

anterior third orangish, disc browned, posterior margin brown or yellow. Forewings (Figs 10A, B, 11A, B, 29A) brown to dark-brown, with longitudinal yellow stripes on lateral margins of clavus, anterior portion of M vein, and costal margin. Legs and abdomen (Figs 10A, B, D, 11B, 12A, B) without dark markings. — ***Male terminalia***: Pygofer (Fig. 11D), in lateral view, posterior margin broadly rounded. Subgenital plate (Fig. 11D), in lateral view, attaining pygofer apical portion. Valve (Fig. 11E), in ventral view, margins subparallel, lateral margins acute anteriorly. Style (Fig. 11G), in dorsal view, with a slight dentate preapical process on outer margin. Aedeagus (Fig. 11G, H), in lateral view, shaft expanded, ventral margin with anteriorly projected process; apical portion slightly rugulose, apex rounded. Paraphysis (Fig. 11I), in lateral view, directed posterodorsally, rectilinear, reaching pygofer apical third; dorsal and ventral margins subparallel, apex subacute; in dorsal view (Fig. 11J), sinuous preapically.

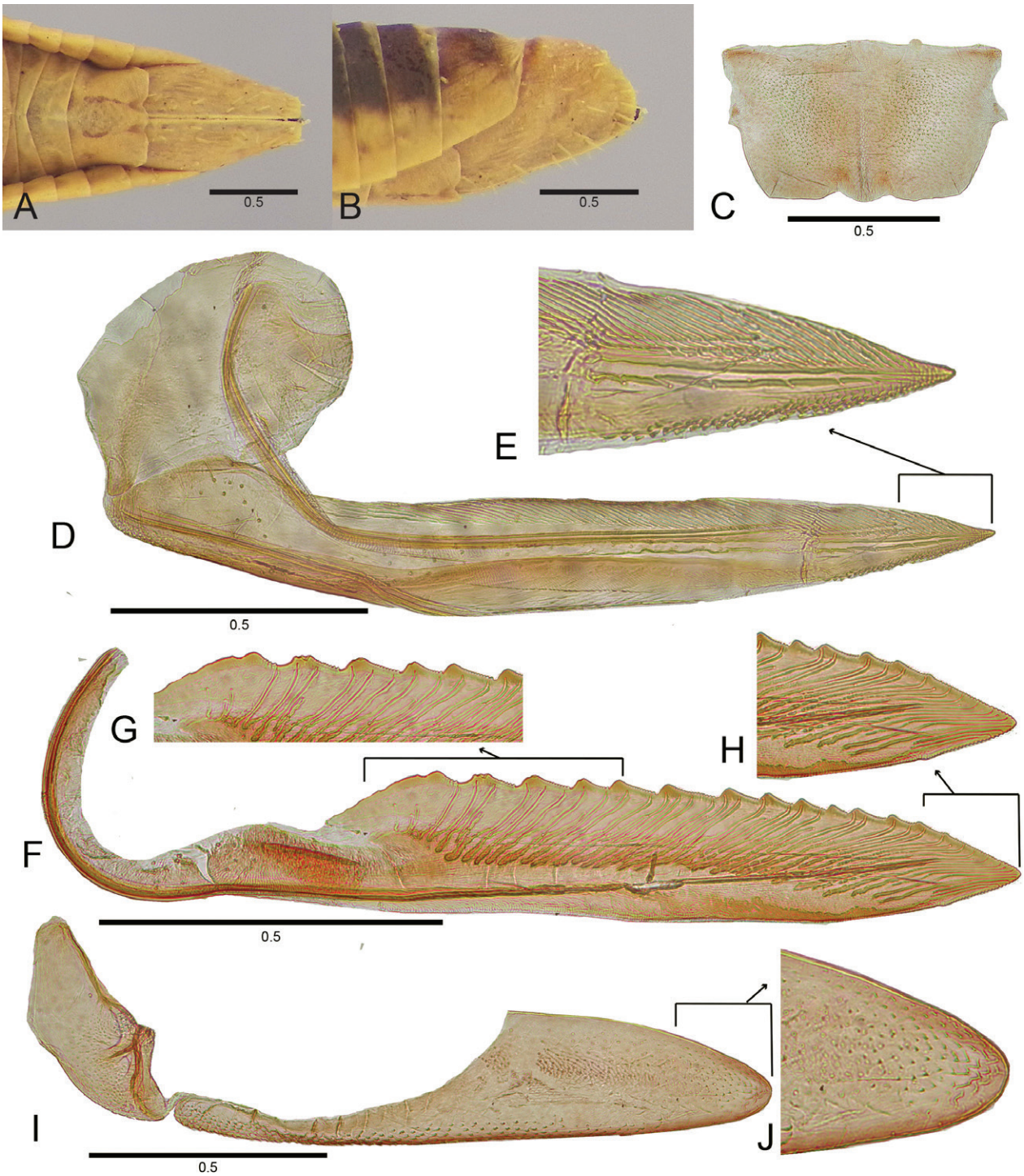

Figure 12. *Ciminius sidanus*, female. **A** distal portion of abdomen, ventral view; **B** distal portion of abdomen, lateral view; **C** sternite VII, ventral view; **D** first valvifer and first valvula, lateral view; **E** apical portion of first valvula; **F** second valvula, lateral view; **G** median portion of second valvula; **H** apical portion of second valvula; **I** second valvifer and gonoplac, lateral view; **J** apical portion of gonoplac. Scale bars in mm.

Other features as in generic description. — ***Female genitalia***: Sternite VII (Figs 10D, 12A–C), in ventral view, 1.7× wider than long, posterior margin with a distinctly rounded median lobe. Valvula II (Fig. 12F–H) blade with 14 continuous subtriangular serrated teeth. Other features (Fig. 12D, E, I, J) as in generic description.

Material examined. ***Holotype*** (Fig. 9): UNITED STATES OF AMERICA – **Arizona** • 1♀ Baboquivari; 8 Fev. 1931; Ball leg.; USNMENT 01513861; USNM

Other material. UNITED STATES OF AMERICA – **Arizona** • 2♂♂, 2♀♀; Altar Valley; 17 Oct. 1937; Oman leg.; USNM • 1♂, 1♀; Baboquivari; 8 Sep. 1935; E. D. Ball leg.; USNM.

Remarks. *Ciminius sidanus* presents a unique coloration in *Ciminius*, which is responsible for its easy recognition. Otherwise, the male genitalia assemble with *C. hartii* differentiating in a few features, as the presence of rugosities basally on aedeagus ventral margin and aedeagus apex expanded, while in *C. sidanus* the rugosities are restricted to preapical portion and the aedeagus apex is not expanded in lateral view. Although the separation of these two species is possible using the coloration and male genitalia, the similarities between them are strong, which suggest the necessity of a future molecular analysis to confirm their status as separate species.

Ciminius taosus (Ball)

Figures 13–15, 29C, D

Cicadella taosa Ball, 1936: 20.
Ciminius sidanus DeLong & Knull, 1946a: 17.

Diagnosis. Overall coloration (Figs 13A, B, 15A, B, 29C) dark-brown to black with paler markings on crown, pronotum anterior third, and at least on veins of anterior portion of forewings. Aedeagus (14G), in lateral view, ventral margin rounded and expanded, with rugosities preapically; apical portion not expanded, apex rounded. Paraphysis (Figs 14I, J) directed posterodorsally, slightly curved dorsally, with dorsal and ventral margins subparallel, bearing a subapical constriction dorsally.

Description. ***Measurements***: Total length: males (n = 1) 4.7 mm; females (n = 1) 5.7 mm. — ***Head and Thorax***: Crown (Figs 13B, 14A, 29C), in dorsal view, slightly produced, anterior margin subtriangular; median length approximately 1/3 of intraocular width, and 1/4 of transocular width. Ocelli located slightly posteriorly of imaginary line between anterior eyes angles. Frons (Figs 13A, 14B), in lateral view, slightly inflated. Pronotum width approximately equal to transocular width. Other features as in genus description. — ***Coloration***: Overall coloration of male black (Figs 14A–C). Crown and face (Figs 14A, C) with yellow markings in ocelli and muscular impressions. Clypeus, gena and lorum yellow. Pronotum (Fig. 14A) anterior third with yellow markings, black posteriorly, with posterior margin yellow. Mesonotum black. Forewings veins yellow basally (Figs 14A, B). Legs yellow (Fig. 13B, C). Female overall coloration yellow (Figs 13, 29C). Crown and pronotum (Figs 13B, 29C) anterior third with darker markings. Frons (Figs 13, 29D) with darker areas in muscular impressions. Forewings (Figs 13A, B, 29C, D) browned, with veins paler. Abdomen (Figs 13D, 15A, B), yellow, with darkened portions. — ***Male terminalia***: Pygofer (Fig. 14D), in lateral view, posterior margin broadly rounded. Subgenital plate (Fig. 14D), in lateral view, attaining pygofer apical portion. Valve (Fig. 14E), in ventral view, anterior and posterior margins subparallel; lateral margins narrowly rounded. Style (Fig. 14F), in dorsal view, with a pair of slight dentate processes on outer margin, one basally and other preapically. Aedeagus (Fig. 14G, H), in lateral view, shaft expanded, ventral margin rounded, apical portion rugulose, apical portion not expanded, apex rounded. Paraphysis (Fig. 14I), in lateral view, directed posterodorsally, curved dorsally, reaching pygofer apical third; dorsal and ventral margins subparallel, dorsal margin with a small dentate process basally, apex subacute; in dorsal view (Fig. 14J), lateral margins with small reentrances preapically. Other features as in generic description. — ***Female genitalia***: Sternite VII (Figs 13D, 15A–C), in ventral view, almost 2.2× wider than long, posterior margin with a distinctly acute median lobe. Valvula II (Fig. 15F–H) blade with 18 continuous subtriangular serrated teeth, with a distinct gap in anterior margin of teeth. Other features (Fig. 15D, E, I, J) as in generic description.

Material examined. ***Holotype*** (Fig. 12): UNITED STATES OF AMERICA – **New Mexico** • 1♀**;** Albuquerque; 1940; ED Ball leg.; USNMENT 01513862; USNM.

Other material. UNITED STATES OF AMERICA – **New Mexico** • 1♂**;** Belen; 20 Jul. 1936; R. H. Beamer leg; USNM • 1♀ same data collection as for preceding; D. R. Lindsay leg; USNM.

Remarks. *Ciminius taosus* is the largest member of *Ciminius*. The males of *C. taosus* can be differentiated in coloration from the other black species by the forewings with yellow longitudinal veins, fading towards apex, and the crown and frons contrasting yellow and black marks. In dorsal view (Figs 12B, 13A, 28C), the crown is longer, as in lateral view (Figs 12A, 13B), the frons is more inflated compared to the remaining species of the genus. The aedeagus of *C. taosus* is similar to *C. sidanus* and *C. hartii*, but the ventral margin is more expanded than in the former and the apex is not expanded as in the latter. Otherwise, the paraphysis in *C. taosus* is curved dorsally, while in *C. sidanus* and *C. hartii* it is rectilinear.

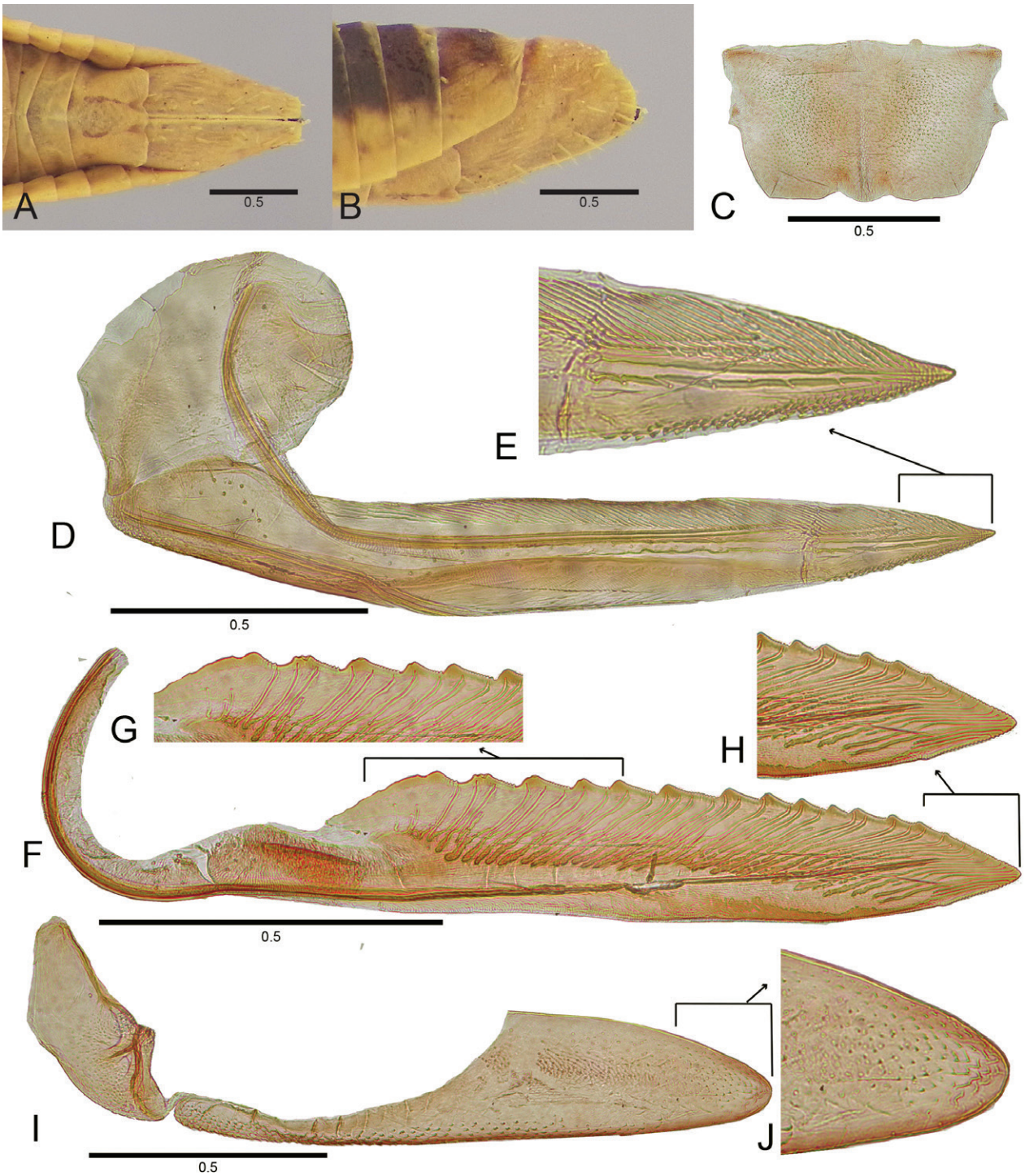

Figure 13. *Ciminius taosus*, holotype female. **A** habitus, lateral view; **B** habitus, dorsal view; **C** head, frontal view; **D** genital capsule, ventral view; **E** labels. Scale bar in mm.

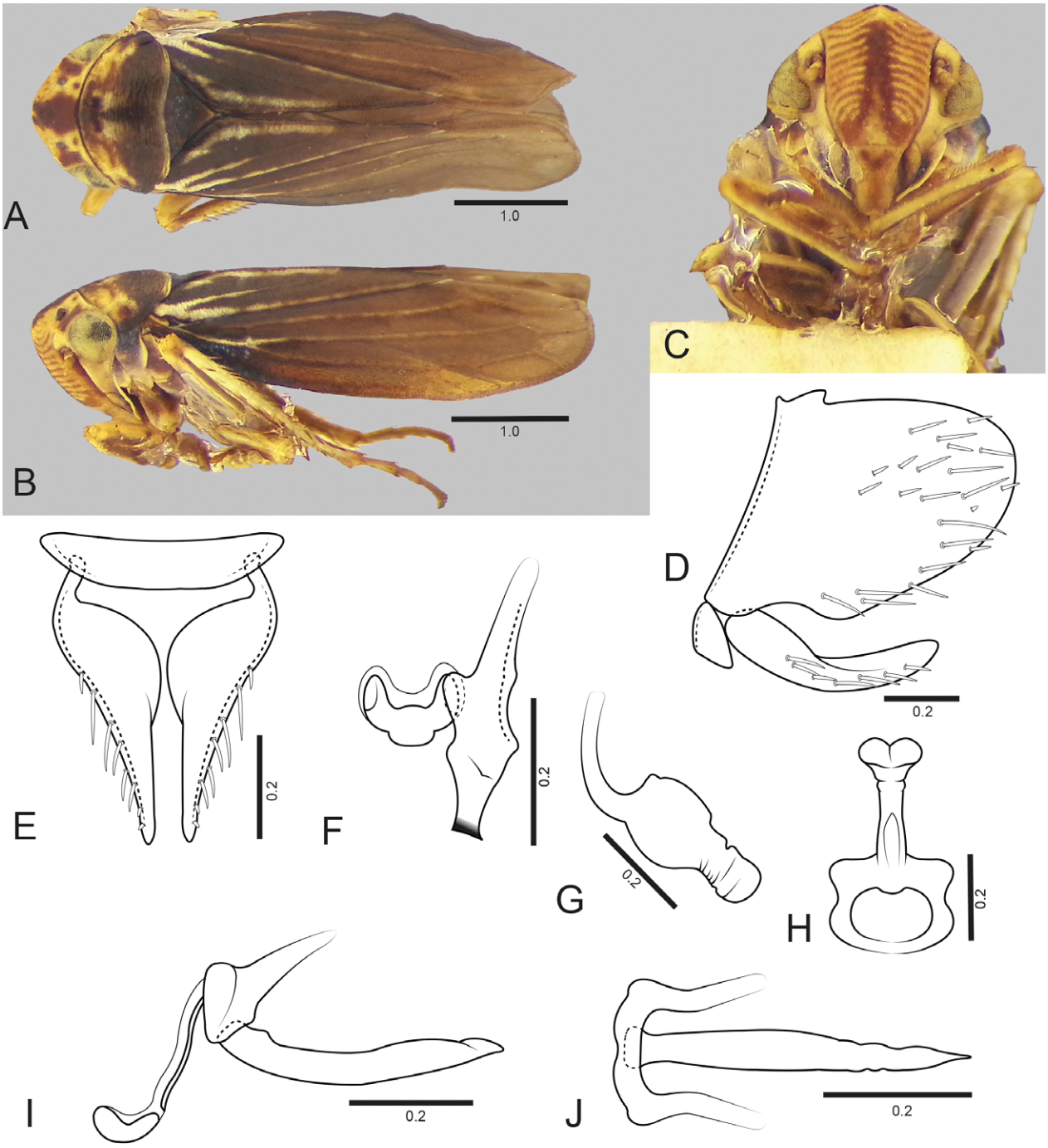

Figure 14. *Ciminius taosus*, male. **A** habitus, dorsal view; **B** habitus, lateral view; **C** head, frontal view; **D** pygofer, valve and subgenital plate, lateral view; **E** valve and subgenital plates, ventral view; **F** connective and style, ventral view; **G** aedeagus, lateral view; **H** aedeagus, caudoventral view; **I** connective, stem and paraphysis, lateral view; **J** paraphysis, dorsal view. Scale bars in mm.

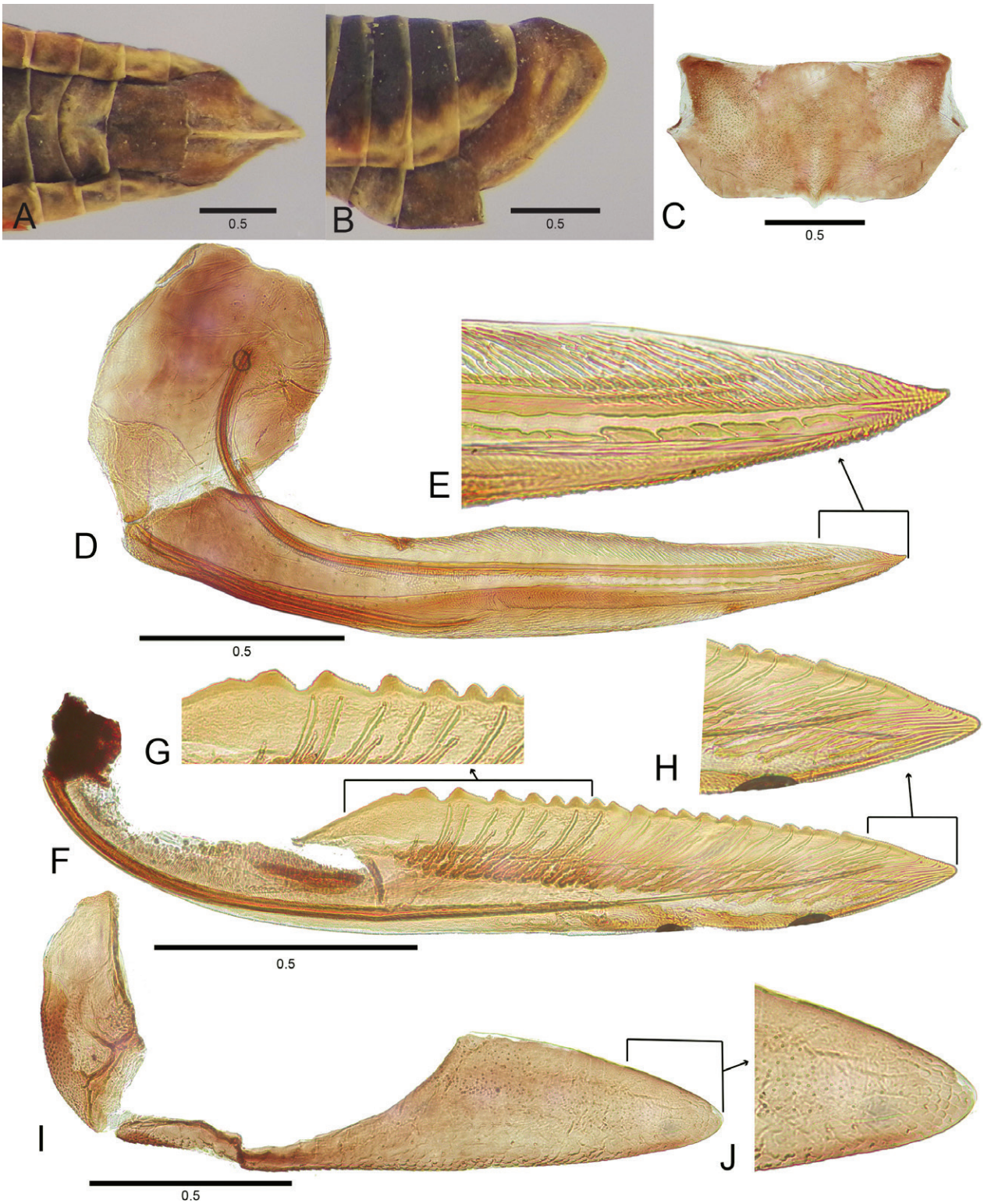

Figure 15. *Ciminius taosus*, female. **A** distal portion of abdomen, ventral view; **B** distal portion of abdomen, lateral view; **C** sternite VII, ventral view; **D** first valvifer and first valvula, lateral view; **E** apical portion of first valvula; **F** second valvula, lateral view; **G** edian portion of second valvula; **H** apical portion of second valvula; **I** second valvifer and gonoplac, lateral view; **J** apical portion of gonoplac. Scale bars in mm.

Ciminius yana Young

Figures 16–19, 29E, F

Ciminius yana Young, 1977: 593.

Diagnosis. Coloration pale-yellow (Fig. 29E, F) to brown (females and rarely males) (Fig. 18) or black (males) (Figs 16, 17A–C), with R+M and base of CuP veins yellow. Aedeagus (Fig. 17G, H) with shaft strongly protuberant, forming a preapical lobate process on dorsal margin, directed apically. Paraphysis (Fig. 17I, J) curved ventrally, with a preapical constriction on ventral margin.

Description. ***Measurements***: Total length: males (n = 11) 3.2–3.7 mm, females (n = 6) 3.9–4.3 mm. — ***Head***

Figure 16. *Ciminius yana*, male holotype.

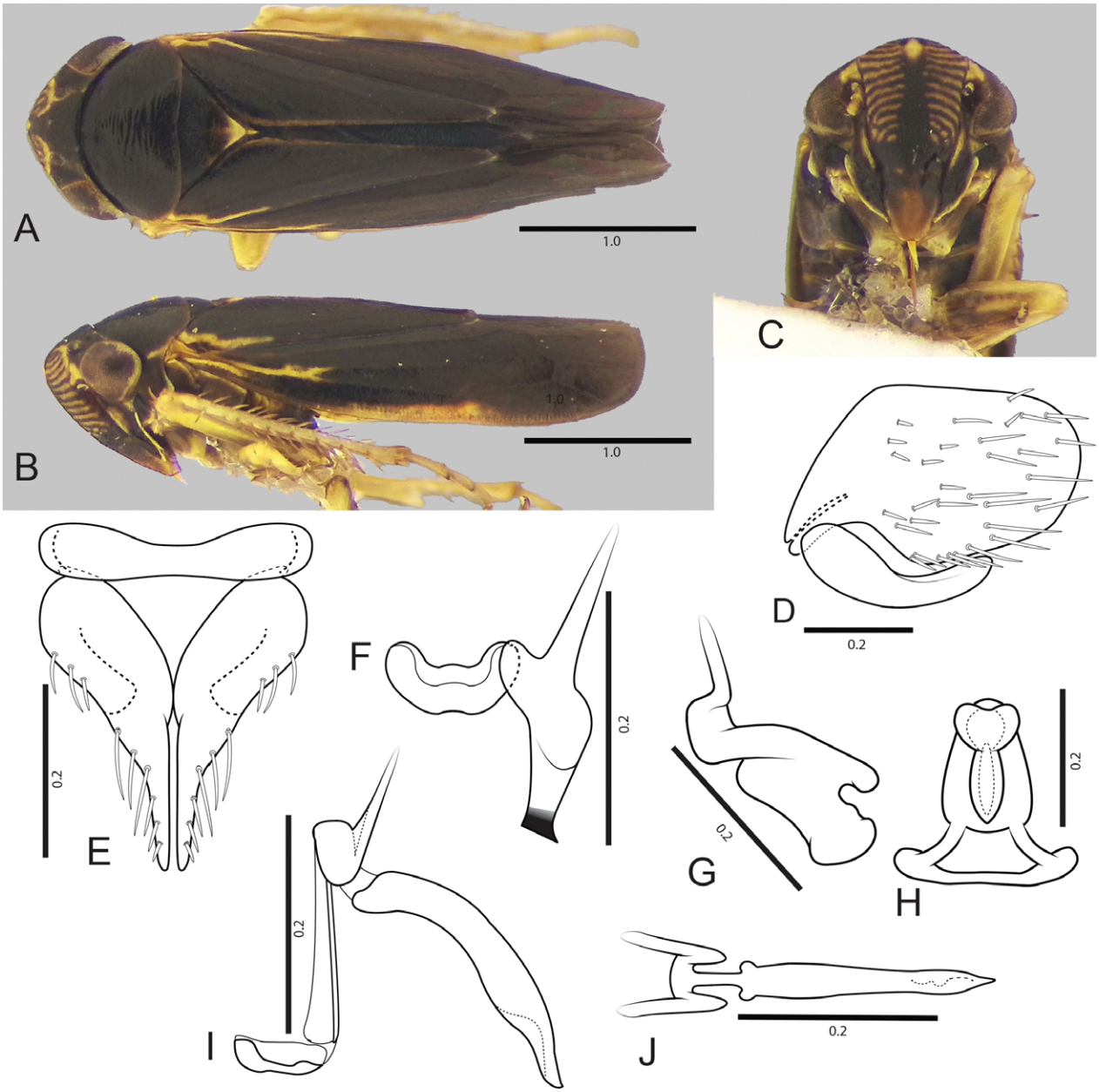

Figure 17. *Ciminius yana*, male **A** habitus, dorsal view; **B** habitus, lateral view; **C** head, frontal view; **D** pygofer, valve and subgenital plate, lateral view; **E** valve and subgenital plates, ventral view; **F** connective and style, ventral view; **G** aedeagus, lateral view; **H** aedeagus, caudoventral view; **I** connective, stem and paraphysis, lateral view; **J** paraphysis, dorsal view. Scale bars in mm.

and Thorax: Crown (Figs 17A, B, 18A, 29E), in dorsal view, from slightly to moderately produced, anterior margin from broadly rounded to subtriangular. Median length of crown from 3/7 to 1/2 of intraocular width, and about 1/4 of transocular width. Pronotum width slightly greater than transocular width. Ocelli aligned to imaginary line between anterior eye angles. Other features as in genus description. — ***Coloration***: Overall coloration from pale-yellow (Fig. 29E, F) to brown (Fig. 18), as described in *C. albolineatus*, especially in females. Males usually with overall coloration black (Figs 16, 17A, B), with marks, bands and maculae as described in *C. albolineatus*. Face (Figs 17C) with yellow marks on muscular impressions, often with yellow longitudinal band medially. Clypeus browned. Gena and lorum black with margins yellow. Forewings (Figs 16, 17A, B) with veins black, except costal cell, basis of claval suture and basis of R+M and C veins distinctly yellow. Legs (Fig. 17B, C) yellowish. Abdomen black, lateral margins yellowish. — ***Male terminalia***: Pygofer (Fig. 17D), in lateral view, posterior margin broadly rounded. Subgenital plate (Fig. 17D), in lateral view, slightly exceeding posteriorly half-length of pygofer. Valve (Fig. 17E), in ventral view, anterior and posterior margins slightly converging medially; lateral margins rounded. Style (Fig. 17F), in dorsal view, without preapical lobe. Aedeagus (Fig. 17G, H), in lateral view, shaft with a preapical lobate process, directed apically; ventral margin without processes; apical portion not expanded, apex rounded. Paraphysis (Fig. 17I, J), in lateral view, curved and directed posteroventrally, almost attaining pygofer apical third, with a preapical constriction on ventral margin, apex subacute. Other features as in genus description. — ***Female terminalia***: Sternite VII (Fig. 19A–C), in ventral view, 1.9× wider than long, posterior margin with median lobe distinct, rounded. Valvula II (Fig. 19F–H) blade with 13 continuous subtriangular serrated teeth, without distinct gap in anterior margin of teeth. Other features (Figs 19D, E, I, J) as in genus description.

Material examined. ***Holotype*** (Fig. 15): BRAZIL – **Mato Grosso** • ♂; Rio Caraguatá; Mar. 1953; F. Plaumann leg.; USNM.

Other Material. BRAZIL – **Paraná** • 1♂; Antonina, Res. [Reserva] Rio Cachoeira; 25.316°S, 48.696°W; 50 m; 23–27 Jan. 2017; A.C. Domahovski leg.; DZUP • 1♀ same data collection as for preceding; Entomologia UFPR leg.; suspended light trap; DZUP • 2♂♂; Tuneiras do Oeste, REBIO das Perobas; 01–04 Apr. 2024; A. C. Domahovski & L. Alasmar, leg.; sweep; DZUP. – **Mato Grosso do Sul** • 1♂ Barranco Branco; 22 Dec. 1925; Souto Maior leg.; DZUP. – **São Paulo** • 1♂; Marília; 22.19384°S, 49.92172°W; 20 Nov. 2022; L. Alasmar leg.; sweep; DZUP • 2♂♂, 2♀♀; same data collection as for preceding; 18–20 Nov. 2022; DZUP • 1♂; same data collection as for preceding; 22.18927°S, 49.92630°W; 26 Dec. 2022; DZUP • 6♂♂, 3♀♀; same data collection as for preceding; Condomínio Green Valley; 22.16342ºS, 50.00271ºW; 07 Jan. 2023; DZUP.

Remarks. The black males of *C. yana* resemble *Ciminius dissidens* **sp. nov.**. and *Ciminius sesamum* **sp. nov.** but can be distinguished due to the distinct yellow markings on claval suture and basis of R+M and C veins. The pale-yellow to brown males are more similar to *C. albolineatus* and *C. platensis*. Furthermore, males of *C. yana* can be distinguished from other congeners by the conspicuous lobate process on the aedeagus dorsal margin. From all the studied material, a unique black specimen of *C. yana* presented forewings venation that was completely yellow.

Figure 18. *Ciminius yana*, color variation in male, habitus. **A** dorsal view; **B** frontal view. Scale bars in mm.

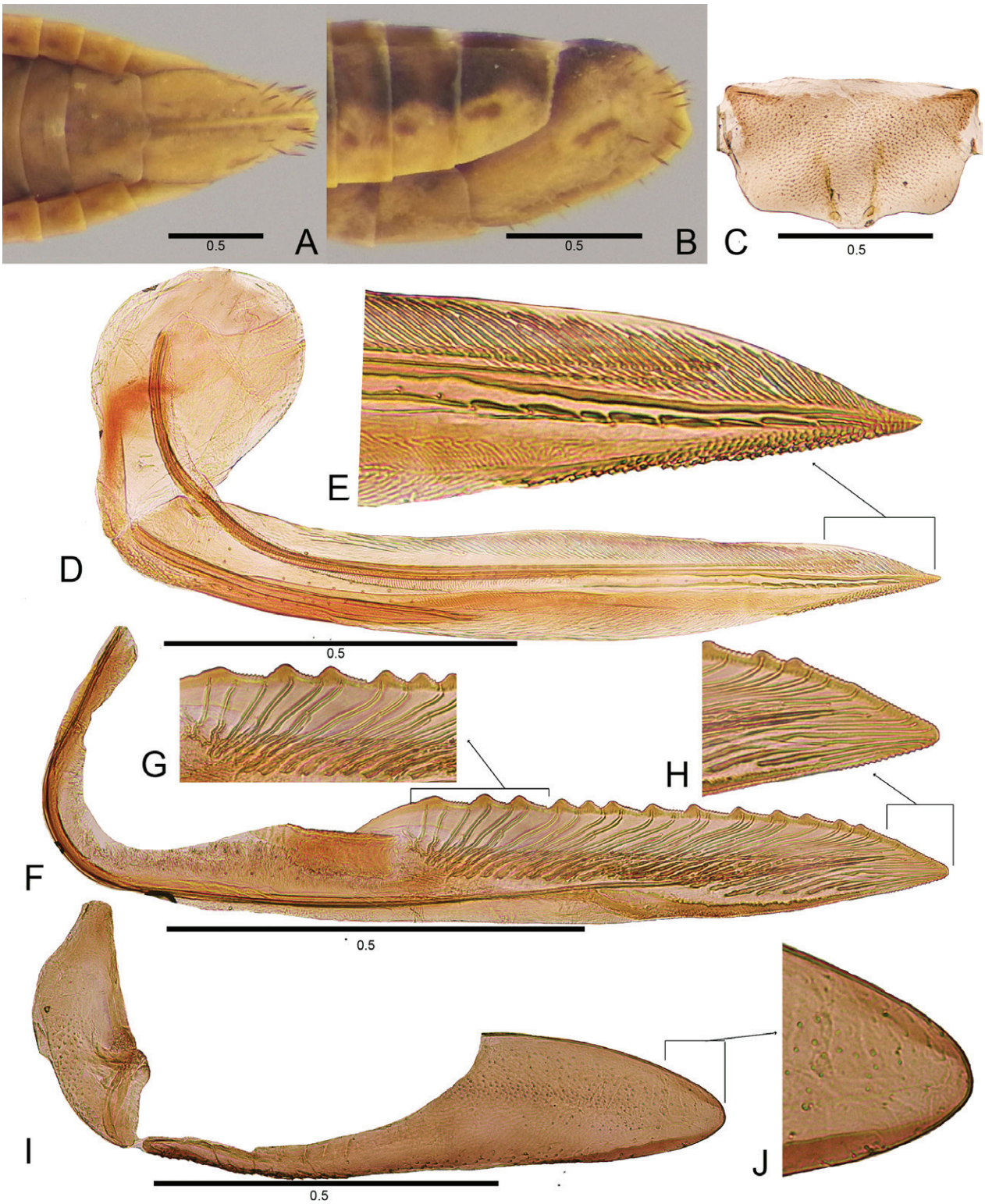

Figure 19. *Ciminius yana*, female. **A** distal portion of abdomen, ventral view; **B** distal portion of abdomen, lateral view; **C** sternite VII, ventral view; **D** first valvifer and first valvula, lateral view; **E** apical portion of first valvula; **F** second valvula, lateral view; **G** median portion of second valvula; **H** apical portion of second valvula; **I** second valvifer and gonoplac, lateral view; **J** apical portion of gonoplac. Scale bars in mm.

Ciminius autumnalis **sp. nov.**

https://zoobank.org/62F35561-ED24-4B70-85C4-825BF36E135A

Figures 20, 21, 30A, B

Diagnosis. Coloration pale-yellow (Figs 20A–C, 30A, B), with copper marks on crown and forewings; claval suture and R+M veins whitened. Aedeagus (Fig. 20G, H) basidorsal portion expanded, ventral margin from shallowly to deeply excavated basally, serrated medially, rectilinear subapically; apical portion expanded, apex rounded forming a hood-like structure. Paraphysis (Fig. 20I, J) directed posterodorsally, with a preapical constriction on ventral margin.

Description. ***Measurements***: Total length: holotype male 4.0 mm; paratypes, males (n = 11) 4.0–4.3 mm; females (n = 5) 4.5–4.63 mm. — ***Head and Thorax***: Crown

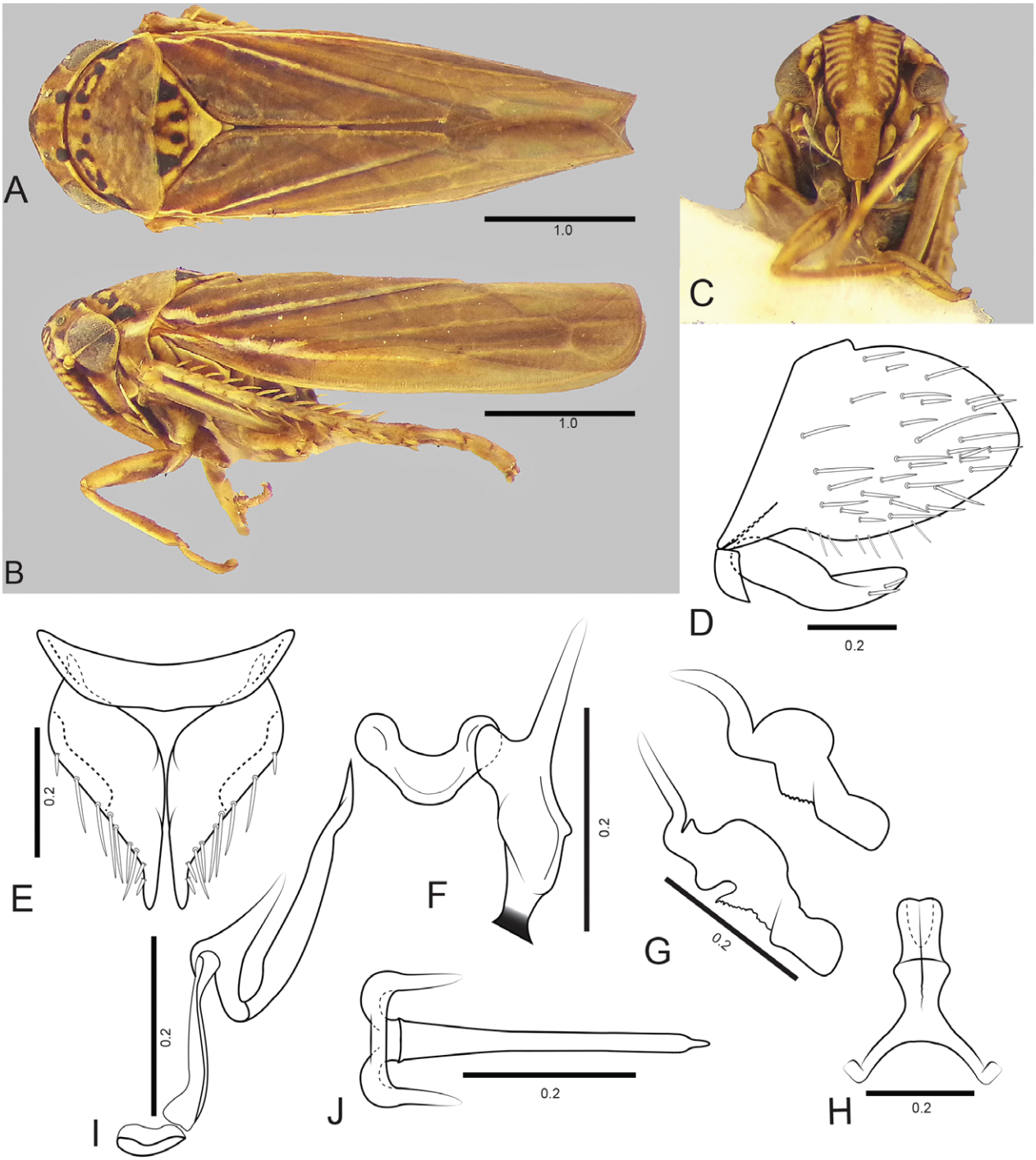

Figure 20. *Ciminius autumnalis* **sp. nov.**, male holotype. **A** habitus, dorsal view; **B** habitus, lateral view; **C** head, frontal view; **D** pygofer, valve and subgenital plate, lateral view; **E** valve and subgenital plates, ventral view; **F** connective and style, ventral view; **G** aedeagus, lateral view; **H** aedeagus, caudoventral view; **I** connective, stem and paraphysis, lateral view; **J** paraphysis, dorsal view. Scale bars in mm.

(Figs 20A, B, 30A), in dorsal view, slightly produced, anterior margin subtriangular; median length from 2/7 to 1/2 of intraocular width, and about 2/5 of transocular width. Ocelli located slightly before the imaginary line between anterior eye angles. Pronotum width approximately equal to transocular width. Other features as in generic description. — ***Coloration***: Overall coloration pale-yellow (Figs 20A–C, 30A, B). Crown (Figs 20A, 30A), in dorsal view, with distinct browned areas. Pronotum, in dorsal view, anterior third with distinct browned

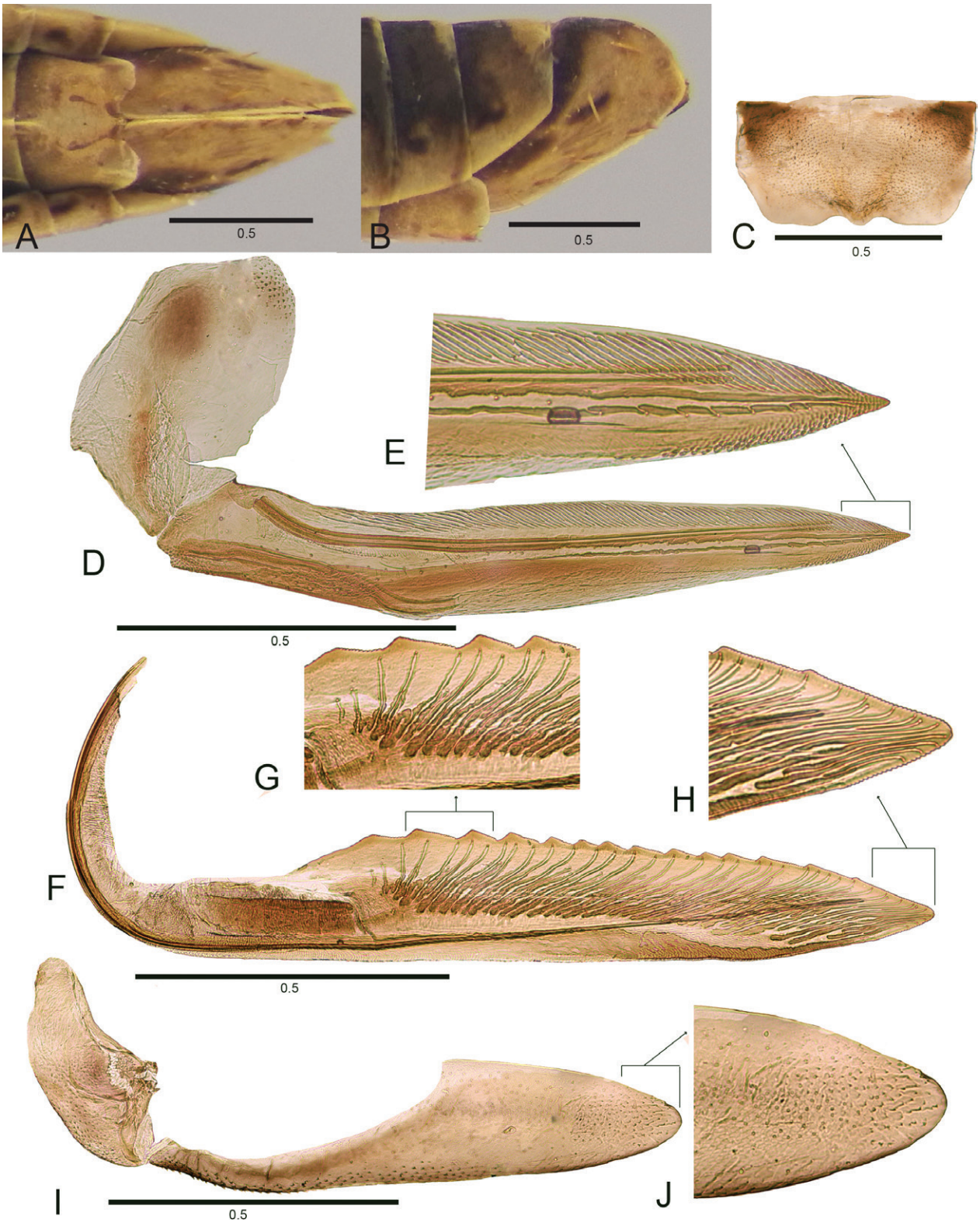

Figure 21. *Ciminius autumnalis* **sp. nov.**, female paratype. **A** distal portion of abdomen, ventral view; **B** distal portion of abdomen, lateral view; **C** sternite VII, ventral view; **D** first valvifer and first valvula, lateral view; **E** apical portion of first valvula; **F** second valvula, lateral view; **G** median portion of second valvula; **H** apical portion of second valvula; **I** second valvifer and gonoplac, lateral view; **J** apical portion of gonoplac. Scale bars in mm.

marks and darkened maculae, posterior third smoky paler. Forewing (Figs 20A, B, 30A) with cubital and first anal veins copper-brown; R+M vein, claval suture whitened, other veins yellow. Other features as in *C. albolineatus* description. — ***Male terminalia***: Pygofer (Fig. 20D), in lateral view, posterior margin rounded, slightly tapering towards apex. Subgenital plate (Fig. 20D), in lateral view, almost reaching pygofer half-length. Valve (Fig. 20E), in ventral view, margins subparallel, lateral margins subacute. Style (Fig. 20F), in dorsal view, with a slight dentate process medially in outer margin. Aedeagus (Fig. 20G, H), in lateral view, shaft from slightly to broadly protuberant, ventral margin from shallowly to deeply excavated basally, with serrated processes medially, rectilinear subapically; apical portion expanded, apex rounded, forming a hood-like structure. Paraphysis (Fig. 20I, J), in lateral view, rectilinear, directed posterodorsally, almost reaching pygofer apical third, with a conspicuous preapical constriction on ventral margin, apex acute. Other features as in generic description. — ***Female terminalia***: Sternite VII (Fig. 21A–C), in ventral view, 1.9× wider than long; posterior margin shallowly excavated each side of a small and distinct median lobe. Valvula II (Fig. 21F–H) blade with 14 continuous triangular serrated teeth, without a distinct gap in anterior margin of teeth. Other features (Fig. 21D, E, I, J) as in generic description.

Material examined. ***Holotype***: BRAZIL – **Paraná** • ♂; Ponta Grossa, Parque Estadual de Vila Velha; 11 Apr. 2015; A.C. Domahovski leg; sweep; DZUP. — ***Paratypes***: BRAZIL – **Paraná** • 3♂♂, 1♀; same data collection as for holotype; DZUP • 2♂♂ same data collection as for holotype; 24 Mar. 2016; B. Rosa & C. Yamakawa leg.; Moericke; DZUP • 4♂♂, 1♀; Tibagi, P.E. Guartelá; 11–16 Jan. 2024; 24°33'42"S, 50°13'31"W; 980 m; A. Paladini, L. Alasmar & A. C. Domahovski leg.; DZUP • 1♂, 1♀; same data collection as for preceding; DZRJ • 1♂, 1♀; same data collection as for preceding MNRJ • 1♂, 1♀; same data collection as for preceding USNM.

Etymology. The epithet "autumnalis" means "from autumn" in Latim, and refers to the specimens' coloration, reminding autumn leaves. This is a noun in apposition.

Remarks. *Ciminius autumnalis* **sp. nov.** resembles *C. albolineatus* and *C. platensis* due to their size and overall coloration. *Ciminius autumnalis* **sp. nov.** can be differentiated from the other *Ciminius* species by the following male genitalia aspects: the aedeagus dorsal margin distinctly rounded dorsally, ventral margin serrated medially and rectilinear subapically; and paraphysis rectilinae, directed dorsally, with a distinct preapical constriction ventrally. The specimens of *C. autumnalis* **sp. nov.** presents variations in the aedeagus. In seven specimens studied, there were variations in shaft roundness, which can be strongly or moderately rounded dorsally, and in basiventral margin, which can be rectilinear or with a reentrance. The most distinct patterns were provided in the illustration (Fig. 19G). The paraphysis structure presented a variation in curvature degree, from slight to distinctly curved, but the shape remaining the same.

Ciminius dissidens sp. nov.

https://zoobank.org/2B843124-090F-4D62-BFF9-19D1FF1959C5

Figures 22–24, 30C, D, 50C

Diagnosis. Coloration black (males) (Fig. 22A, B) or reddish (Figs 23, 24C, D, 30C) (females, rarely males). Aedeagus (Fig. 22G, H) shaft distinctly wide in lateral view, ventral margin entirely serrated, apical portion expanded, apex broadly rounded, forming a hood-like structure. Paraphysis (Fig. 22I, J) almost straight, ventral and dorsal margins converging apically.

Description. ***Measurements***: Total length: holotype male 3.9 mm; paratypes, males (n = 19) 3.8–4.2 mm; females (n = 20) 4.6–5.2 mm. — ***Head and Thorax***: Crown (Figs 22A, B, 23A, 30C), in dorsal view, slightly produced, anterior margin often subtriangular, rarely broadly rounded, median length from 1/6 to 1/5 of intraocular width, and about 1/3 of transocular width. Ocelli located slightly before the imaginary line between anterior eye angles. Pronotum width approximately equal to transocular width. Other features as in generic description. — ***Coloration***: Females (Fig. 30C) with crown and pronotum browned, with marks and maculae as in *C. albolineatus*. Forewings distinctly reddish, with veins yellow. Abdomen (Figs 24A–C, 50C), in ventral view, darkened, with lateral margins and terminalia yellow, prosternum and metasternum darkened. Legs yellow. Other features as described in *C. albolineatus*. Males rarely as females (Fig. 23), mostly with overall coloration black (Fig. 22A–C), with marks, bands, and maculae as in *C. albolineatus*, but with marks often reddish and smoother. Face (Figs 22C, 23B, 30D), with yellow marks on muscular impressions, often with a yellow longitudinal band medially. Clypeus darkened with yellowed areas medially. Gena and lorum yellow with darkened areas. Pronotum (Figs 22A, 23A, 30C) posterior third often entirely black. Forewing (Fig. 22B) black, veins concolor, except costal margin, R+M stem and basal portion of claval suture and Pcu yellowish or reddish. Abdomen darkened, lateral margins yellow. — ***Male terminalia***: Pygofer (Fig. 22D), in lateral view, posterior margin rounded. Subgenital plate (Fig. 22D), in lateral view, slightly surpass half of pygofer. Valve (Fig. 22E), in ventral view, margins subparallel, lateral margins subacute. Style (Fig. 22F), in dorsal view, with preapical lobe. Aedeagus (Figs 22G, H), in lateral view, conspicuously wide; shaft slightly protuberant dorsally; ventral margin entirely serrated; apical portion expanded, apex rounded, forming a hood-like structure. Paraphysis (Fig. 22I, J), in lateral view, directed posteroventrally, almost straight, not attaining pygofer apical third, apex subacute. Other features as in generic description. — ***Female terminalia***: Sternite VII (Fig. 24A–C), in ventral view, 1.7× wider than long, posterior margin with a nearly indistinct median lobe. Valvula II (Fig. 24F, G) blade with 18 continuous triangular serrated teeth, without a distinct gap on anterior margin of teeth. Other features (Fig. 24D, E, I, J) as in generic description.

Etymology. The epithet "dissidens" means "different" in Latim. It refers to the reddish coloration of females that can also occur in males, and is different from any other color pattern known in *Ciminius*. This is a noun in apposition.

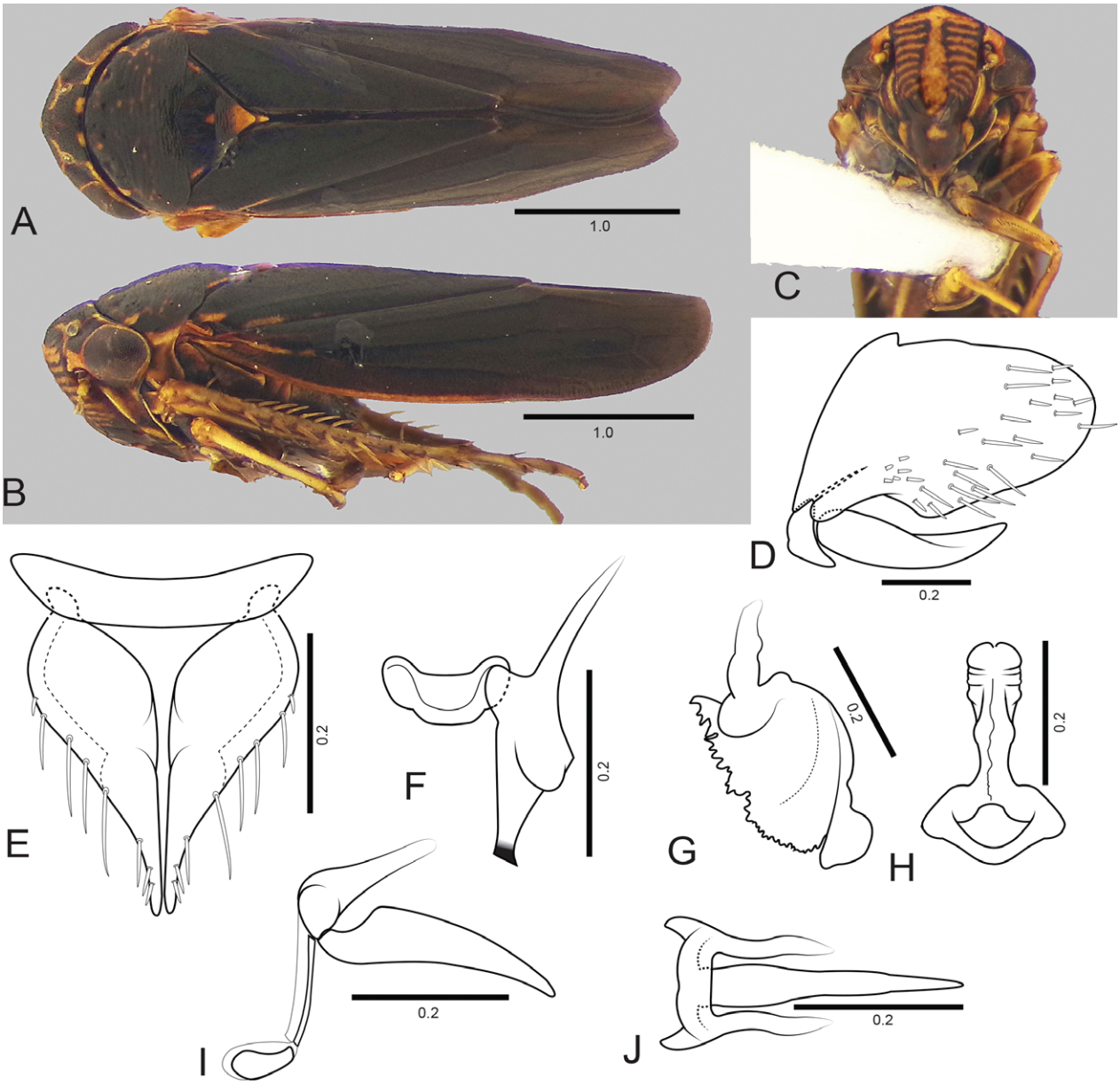

Figure 22. *Ciminius dissidens* **sp. nov.**, male holotype. **A** habitus, dorsal view; **B** habitus, lateral view; **C** head, frontal view; **D** pygofer, valve and subgenital plate, lateral view; **E** valve and subgenital plates, ventral view; **F** connective and style, ventral view; **G** aedeagus, lateral view; **H** aedeagus, caudoventral view; **I** connective, stem and paraphysis, lateral view; **J** paraphysis, dorsal view. Scale bars in mm.

Figure 23. *Ciminius dissidens* **sp. nov.**, color variation in male, habitus. **A** dorsal view; **B** frontal view. Scale bars in mm.

Material examined. ***Holotype***: BRAZIL – **Paraná** • ♂; Ponta Grossa, Parque Estadual de Vila Velha; 11 Apr. 2015; A.C. Domahovski leg.; sweep; DZUP. — ***Paratypes***: BRAZIL – **Paraná** • 2♂♂, 4♀♀; same data collection as for holotype; DZUP; 1♂; Ponta Grossa, Parque Estadual Vila Velha; 25 Nov. 2011; 965 m; 25°13'49''S, 49°59'65''W; A.C. Domahovski leg.; sweep; DZUP • 1♂; same collection data as for preceding, 24 Mar. 2016; B. Rosa & C. Yamakawa; Moericke; DZUP • 1♂ same data as preceding; 21 Nov. 2015; DZUP • 9♂♂, 17♀♀ same data collection as for preceding; 25.247579°S, 49.992188°W; 930 m; 14 Dec. 2022; A. P. Pinto, A. C. \ Domahovski, L. Alasmar, \ J. Ehlert & L. P. Aguiar leg, sweep; DZUP • 10♂♂, 10♀♀; same collection data as for preceding; DZRJ • 10♂♂, 10♀♀; same collection data as for preceding; MNRJ • 5♂♂, 5♀♀; same collection data as for preceding; USNM • 5♂♂, 5♀♀; same collection data as for preceding; MZUSP.

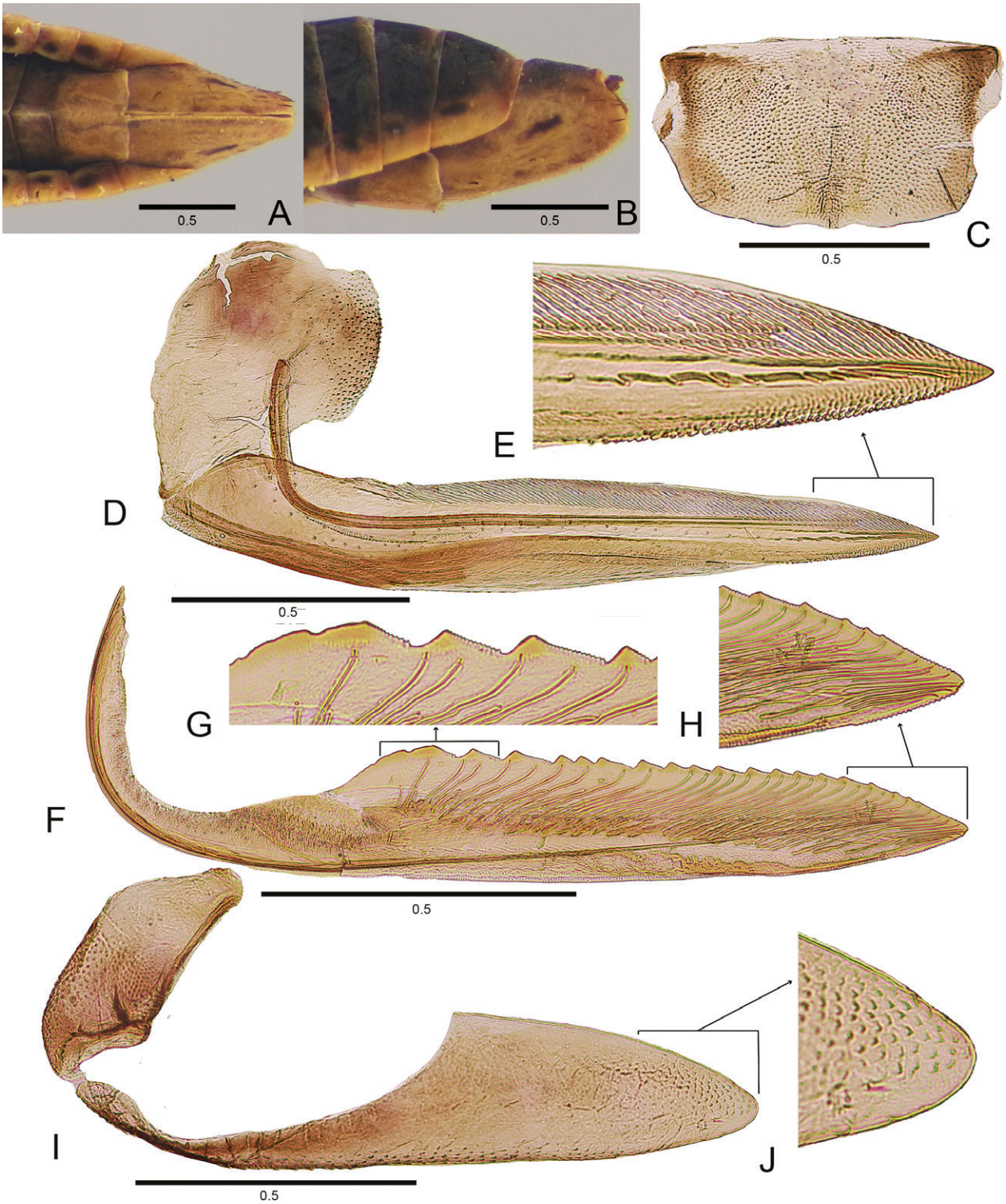

Figure 24. *Ciminius dissidens* **sp. nov.**, female paratype. **A** distal portion of abdomen, ventral view; **B** distal portion of abdomen, lateral view; **C** sternite VII, ventral view; **D** first valvifer and first valvula, lateral view; **E** apical portion of first valvula; **F** second valvula, lateral view; **G** median portion of second valvula; **H** apical portion of second valvula; **I** second valvifer and gonoplac, lateral view; **J** apical portion of gonoplac. Scale bars in mm.

Remarks. The black males of *Ciminius dissidens* **sp. nov.** resemble *C. hartii*, *C. yana*, *C. sesamum* **sp. nov.** and the black male specimens of *C. albolineatus*, due to their coloration and size. Although *Ciminius dissidens* **sp. nov.** tends to present more distinct yellow areas on the pronotum and head, and reddish portions laterally, different from *Ciminius sesamum* **sp. nov.** and *C. yana.* In addition, the forewing veins are never yellow, differing from *C. albolineatus*. *Ciminius dissidens* **sp. nov.** males can be distinguished from the other *Ciminius* species by the distinct wide aspect of the aedeagus in lateral view, with serrated processes along the entire ventral margin. The females of *C. dissidens* **sp. nov.**, stand out for their distinct reddish forewing coloration. In a total of 44 males of *C. dissidens* **sp. nov.** studied, 40 males were black and only four were reddish.

Ciminius sesamum sp. nov.

https://zoobank.org/4912AA25-9C7E-4443-9AF7-B8D22BDC74C2

Figures 25–27, 30E, F, 51

Diagnosis. Coloration pale-yellow (Figs 25, 30E, F, 51) or black (only males) (Fig. 25A–C). Black males (Fig. 25A–C) usually without yellowish marks, when present, restricted to pronotum lateral margins and posteriorly to mesonotum transversal sulcus. Aedeagus (Fig. 25G, H) ventral margin serrated; apex expanded forming a hood-like structure. Paraphysis (Figs 25I, J) directed posterodorsally, rectilinear, dorsal and ventral margins subparallel.

Description. ***Measurements***: Total length: holotype male 3.6 mm; paratypes, males (n = 19) 3.4–3.8 mm; paratypes, females (n = 20) 3.7–4.1 mm. — ***Head and Thorax***: Crown (Figs 25A, 26A, 30E, 51A, D), in dorsal view, slightly produced, anterior margin subtriangular; median length from 1/4 to 1/3 of intraocular width, and from 2/5 to 1/2 of transocular width. Ocelli located slightly before the imaginary line between anterior eye angles. Pronotum width approximately equal to transocular width. Other features as in generic description. — ***Coloration***: Crown and pronotum (Fig. 25A, B) often entirely black, rarely with smooth paler areas, arched laterally on pronotum. Face (Fig. 25C) with a yellow band between eyes and frontogenal suture, sometimes surpassing suture, forming a smoky band on frons, yellow marks on muscular impressions, often with a yellow longitudinal band medially. Clypeus black. Gena and lorum yellowed. Mesonotum (Fig. 25A) black anteriorly to transversal sulcus and yellow posteriorly. Forewings (Fig. 25A, B) veins dark. Legs yellow. Abdomen, in lateral view, blackened, bordered with yellow. Males, rarely pale-yellow like the females (Fig. 26), mostly with overall coloration black (Fig. 25A–C). Females with overall coloration pale-yellow (Figs 30E, F, 51), with features as described in *C. albolineatus*. — ***Male terminalia***: Pygofer (Fig. 25D), in lateral view, posterior margin rounded, slightly narrowed apically. Subgenital plate (Fig. 25D), in lateral view, slightly surpassing half-length of pygofer. Valve (Fig. 25E), in ventral view, margins subparallel, lateral margins subacute anteriorly. Style (Fig. 25F), in dorsal view, without dentate process preapically. Aedeagus (Fig. 25G, H), in lateral view, shaft slightly protuberant, ventral margin anterior two-thirds serrated, apical portion not dentate, expanded, apex rounded, forming a hood-like structure. Paraphysis (Fig. 25I, J), in lateral view, directed posterodorsally, rectilinear, reaching pygofer apical third, dorsal and ventral margins subparallel, apex from acute to subacute. Other features as in generic description. — ***Female genitalia***: Sternite VII (Fig. 27A–C), in ventral view, 2× wider than long, posterior margin with a distinctly median lobe. Valvula II (Fig. 27F–H) blade with 18 continuous subtriangular serrated teeth, with a distinct gap in anterior margin of teeth. Other features (Fig. 27D, E, I, J) as in genus description.

Material examined. Holotype: BRAZIL – **Paraná** • ♂; São José dos Pinhais; 25°36’18”S, 49°11’37”W; 880 m; 08–22 Apr. 2017; A.C. Domahovski leg.; sweep; DZUP. — ***Paratypes***: BRAZIL – **Paraná** • 11♂♂, 1♀; same collection data as for holotype; DZUP • 3♂♂ same collection data as for holotype; MNRJ • 1♂, 1♀; same collection data as for holotype; 07–21 Jan. 2017; DZUP • 1♂; same collection data as for preceding; USNM • 1♂,1♀; same collection data as for preceding; 25–28 Feb. 2017; DZUP • 3♂♂; same collection data as for preceding; USNM • 1♂; same collection data as for preceding; 23 Mar. 2017; DZUP • 5♂♂, 2♀♀; same collection data as for preceding; 02–05 Mar. 2019; DZUP • 1♂, 2♀♀; same collection data as for preceding; MNRJ • 4♂♂, 1♀; same collection data as for preceding; DZRJ • 2♂♂; same collection data as for preceding; 01–31 Mar. 2021; DZUP • 1♂; same collection data as for preceding; 01–30 Nov. 2022; USNM • 1♀; same collection data as for preceding; DZUP • 10♂♂, 3♀♀; Curitiba, Centro Politécnico, UFPR, grasslands near to Biológicas department; 20–25 Jan. 2022; A.C. Domahovski & L. Alasmar leg.; sweep; DZUP • 2♂♂ same collection data as for preceding; MNRJ • 1♂; same collection data as for preceding; Dec. 2022; DZUP • 2♂♂, 1♀; same collection data as for preceding; DZRJ • 1♂, 2♀♀; same collection data as for preceding; USNM.

Etymology. The word “sesamum” is from Latin and means “of sesame”, an allusion to the overall aspect of this species: small, robust, and blackened or yellowed, resembling sesame seeds. This is a noun in apposition.

Remarks. *Ciminius sesamum* **sp. nov.** resemble externally to other black males of the genus: *C. hartii*, *C. yana*, *C. albolineatus*, and *C. dissidens* **sp. nov.**, however, *C. sesamum* **sp. nov.** have a more homogeneous black aspect, with indistinct or faint yellow marks along the crown and pronotum. The only constant yellow mark is in the posterior half of the mesonotum. In the aedeagus, *C. sesamum* **sp. nov.** can be distinguished from *C. yana* due to absence of a lobate distinct process on dorsal margin, distinguished from *C. hartii* and *C. albolineatus* due to the aedeagus bearing the ventral margin serrated, and from *C. dissidens* **sp. nov.**, due the aedeagus not strongly widened in lateral view. In the locality of Centro Politécnico, mostly females presented a submacroptery condition (Fig. 50), which is discussed furthermore.

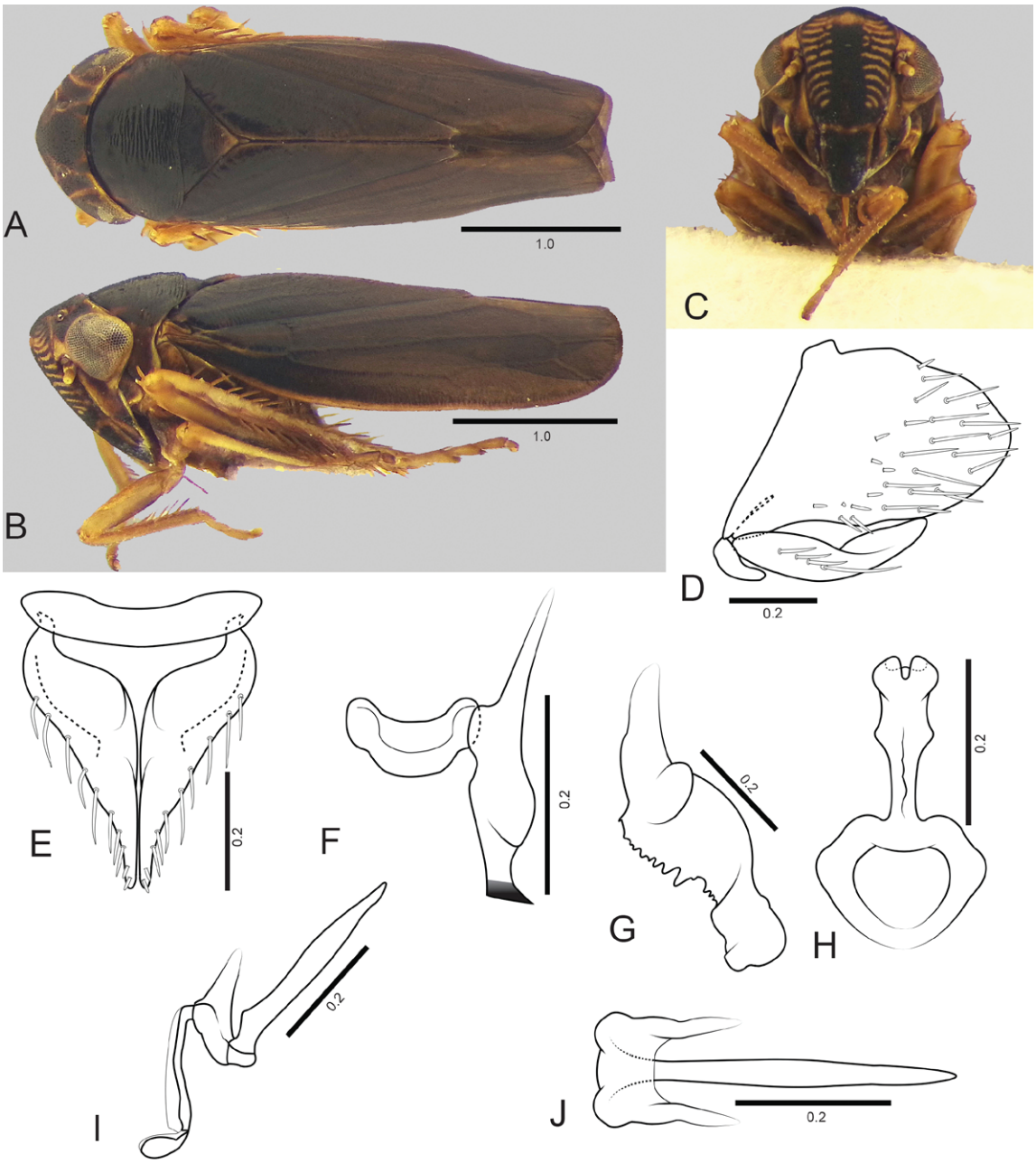

Figure 25. *Ciminius sesamum* **sp. nov.**, male holotype. **A** habitus, dorsal view; **B** habitus, lateral view; **C** head, frontal view; **D** pygofer, valve and subgenital plate, lateral view; **E** valve and subgenital plates, ventral view; **F** connective and style, ventral view; **G** aedeagus, lateral view; **H** aedeagus, caudoventral view; **I** connective, stem and paraphysis, lateral view; **J** paraphysis, dorsal view. Scale bars in mm.

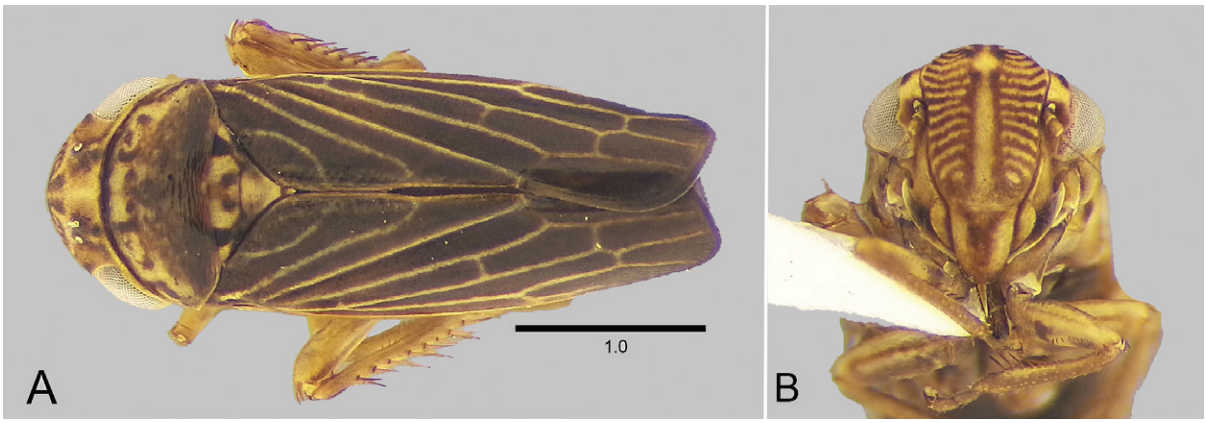

Figure 26. *Ciminius sesamum* **sp. nov.**, color variation in male, habitus. **A** dorsal view; **B** frontal view.

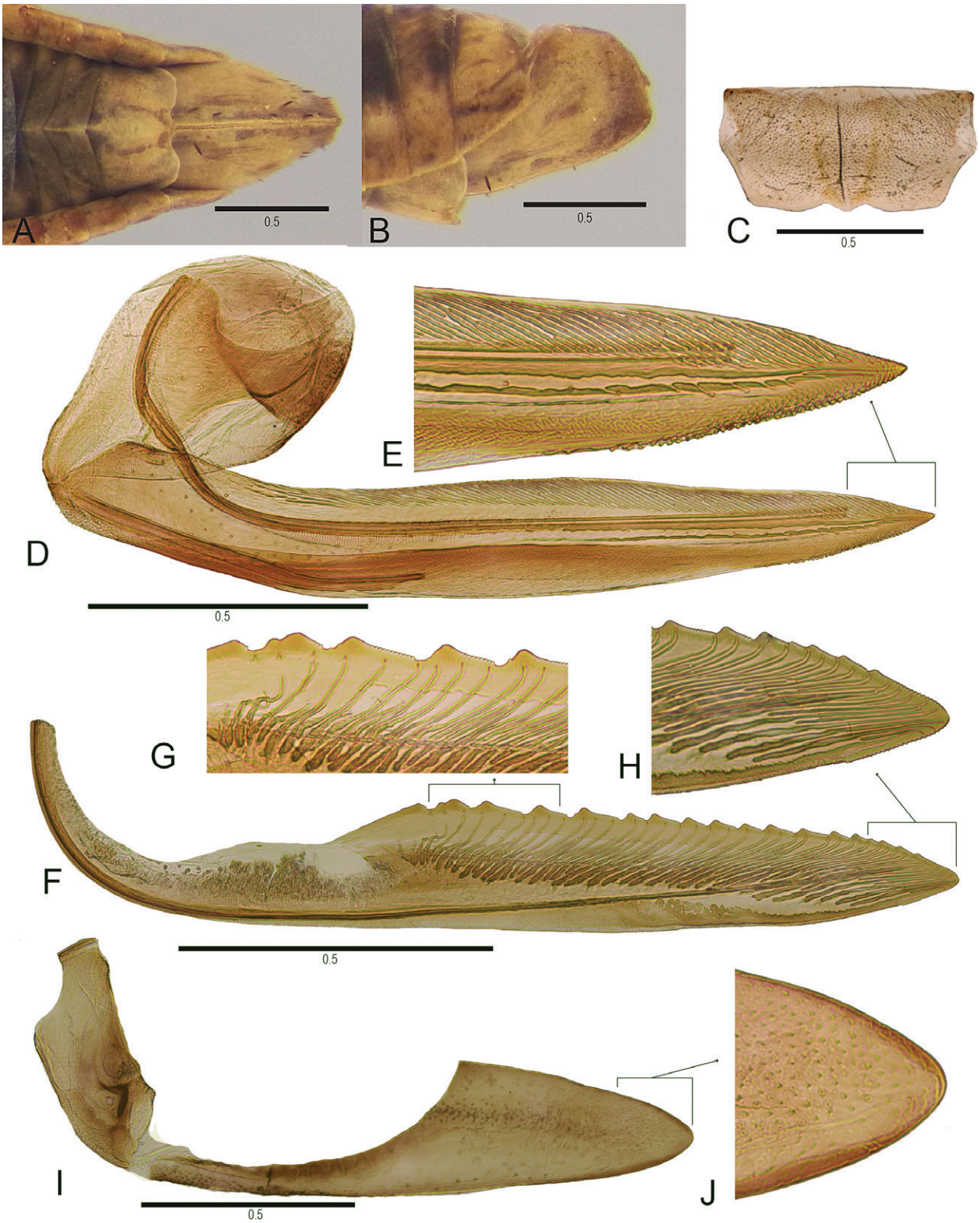

Figure 27. *Ciminius sesamum* **sp. nov.**, female paratype. **A** distal portion of abdomen, ventral view; **B** distal portion of abdomen, lateral view; **C** sternite VII, ventral view; **D** first valvifer and first valvula, lateral view; **E** apical portion of first valvula; **F** second valvula, lateral view; **G** median portion of second valvula; **H** apical portion of second valvula; **I** second valvifer and gonoplac, lateral view; **J** apical portion of gonoplac. Scale bars in mm.

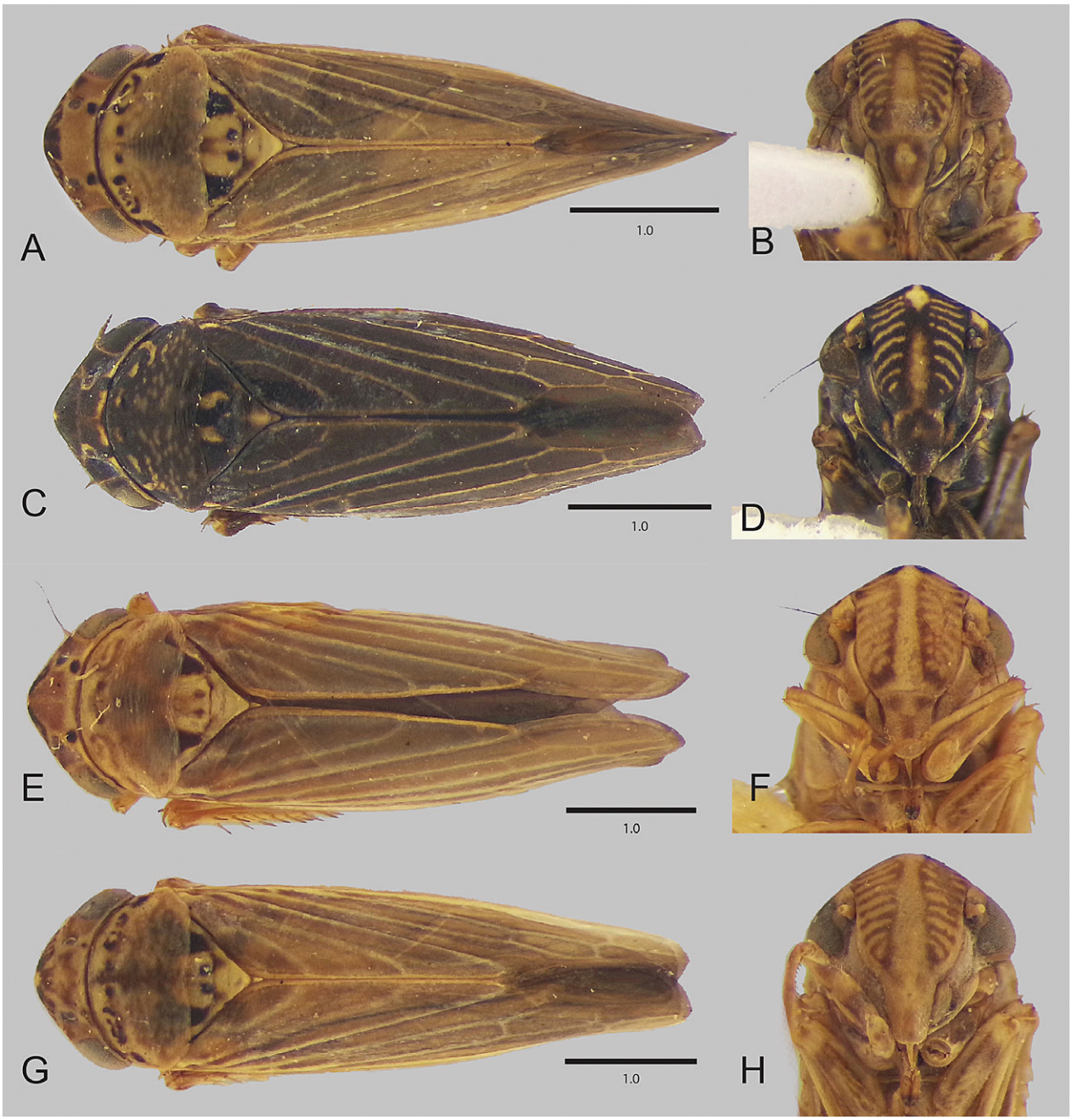

Figure 28. *Ciminius* females habitus, dorsal and frontal view, respectively. **A**, **B** *C. albolineatus*, pale-yellow variety; **C**, **D** *C. albolineatus*, black variety; **E**, **F** *C. hartii*; **G**, **H** *C. platensis*. Scale bars in mm.

Figure 29. *Ciminius* females habitus, dorsal and frontal view, respectively. **A**, **B** *C. sidanus*; **C**, **D** *C. taosus*; **E**, **F** *C. yana*. Scale bars in mm.

Key to males of *Ciminius*

1 Aedeagus ventral margin without processes (Fig. 1G) **2**
1' Aedeagus ventral margin with serrated processes (Fig. 8G) **6**
2 Aedeagus dorsal margin with a conspicuous lobate process preapically (Fig. 17G) ..... ***C. yana* Young, 1977**
2' Aedeagus dorsal margin without those processes (Fig. 1G) **3**
3 Paraphysis rectilinear (Fig. 6G) **4**
3' Paraphysis curved (Fig. 1I) **5**
4 Aedeagus shaft expanded on dorsal and ventral margins, ventral margin with rugosities basally, apex expanded (Fig. 6G); overall coloration black, frons and legs yellow (Fig. 6A–C) ..... ***C. hartii* (Ball, 1901)**
4' Aedeagus shaft expanded on dorsal and ventral margins, ventral margin without or with rugosities preapically, apex not expanded (Fig. 11G); overall coloration yellow, forewings brown with yellow longitudinal stripes (Fig. 11A–C) ..... ***C. sidanus* (Ball, 1936)**
5 Aedeagus ventral margin excavated basally (Fig. 1G); paraphysis curved ventrally (Fig. 1I) ..... ***C. albolineatus* (Taschenberg, 1884)**
5' Aedeagus ventral margin not excavated basally (Fig. 14G); paraphysis curved dorsally (Fig. 14I) ..... ***C. taosus* (Ball, 1936)**
6 Aedeagus with serrated processes along entire length of ventral margin (Fig. 22G) **7**
6' Aedeagus with serrated processes restricted to apical third of ventral margin (Fig. 8G) **8**
7 Aedeagus, in lateral view, conspicuously broadened (Fig. 22G); paraphysis curved ventrally (Fig. 22I) ..... ***C. dissidens* sp. nov.**
7' Aedeagus, in lateral view, slender, apical third expanded, in a hood-like structure (Fig. 25G); paraphysis rectilinear (Fig. 25I) ..... ***C. sesamum* sp. nov.**

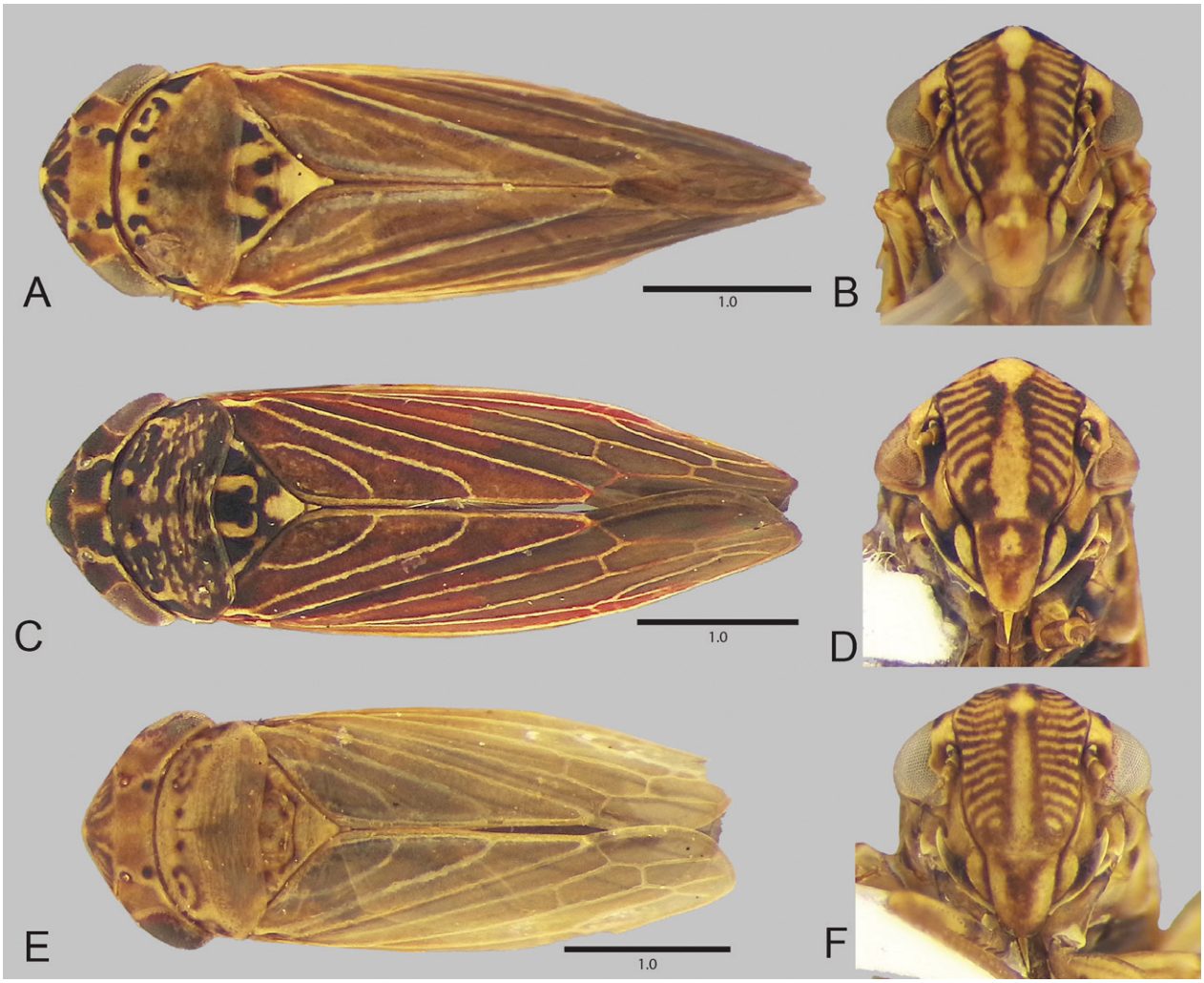

Figure 30. *Ciminius* females habitus, dorsal and frontal view, respectively. **A**, **B** *C. autumnalis* **sp. nov.**; **C**, **D** *C. dissidens* **sp. nov.**; **E**, **F** *C. sesamum* **sp. nov.** Scale bars in mm.

8 Aedeagus ventral margin apical third with two or three large serrated processes (Fig. 8G); paraphysis in dorsal view, broadened at base, tapering towards apex, without preapical constriction (Fig. 8I).....***C. platensis*** **(Berg, 1879)**
Aedeagus ventral margin apical third with numerous small serrated processes (Fig. 20G); paraphysis not broadened at base, lateral margins almost parallel, with a preapical constriction (Fig. 20I)..... ***C. autumnalis*** **sp. nov.**

Description of *Ciminius* sp. immature stages

Figures 31–37

1st instar. Coloration reddish yellow (Figs 31A, 32), with yellowish marks laterally; frons yellowish; a longitudinal pale band from crown to apex of abdomen; posterior margin with a pair of faint darkened maculae between ocelli. Pronotum with a pair of transversal darkened bands, arising from lateral margins and extending almost medially, a pair of rounded dark macula sub medially. Mesonotum with darkened areas medially. Metanotum with three pairs of darkened spots forming a triangle each side of median line. Legs light-yellow.

Head (Fig. 32A), in dorsal view, 1.4× wider than long, anterior margin broadly rounded, slightly emarginated medially, antennal ledges not prominent, scape and pedicel distinct and visible; in lateral view, compound eyes rounded, frons slightly inflated, with clypeus visibly separated; in ventral view (Fig. 32B), muscle impressions distinct, rostrum with three segments, surpassing metathoraxic coxae basis. Pronotum (Fig. 32A), in dorsal view, slender, slightly wider than head width. Mesonotum (Fig. 32A), in dorsal view, width approximately equal to pronotum width, median lobe rounded, slightly smaller than postero-lateral angles. Metanotum (Fig. 32A), in dorsal view, length approximately equal to pronotum and mesonotum combined length. Tarsi (Fig. 32C) with two segments, the basal smaller than the distal, the latter ending in a pair of claws. Abdomen (Fig. 32B) with nine visible segments, the first and second fused and 10th and 11th forming the anal tube.

2nd instar. Overall coloration (Figs 31B, 33) similar to anterior instar, with pale-yellow coloration more consistent and intense, macula and marks more distinct, espe-

cially the pair of maculae between the eyes. Metanotum with three pairs of darkened spots more aligned. Abdomen with the reddish areas smoother.

Head (Fig. 33A), in dorsal view, anterior margin broadly rounded, with a very slight emargination; other head features as in anterior instar. Pronotum, mesonotum and metanotum (Fig. 33A, C) proportions as in anterior instar. Metanotum with length greater than pronotum and mesonotum length combined. Abdomen (Fig. 33B) as in anterior instar, with a segmentation more distinct and apex more sclerotized, initiating the terminalia structures formation.

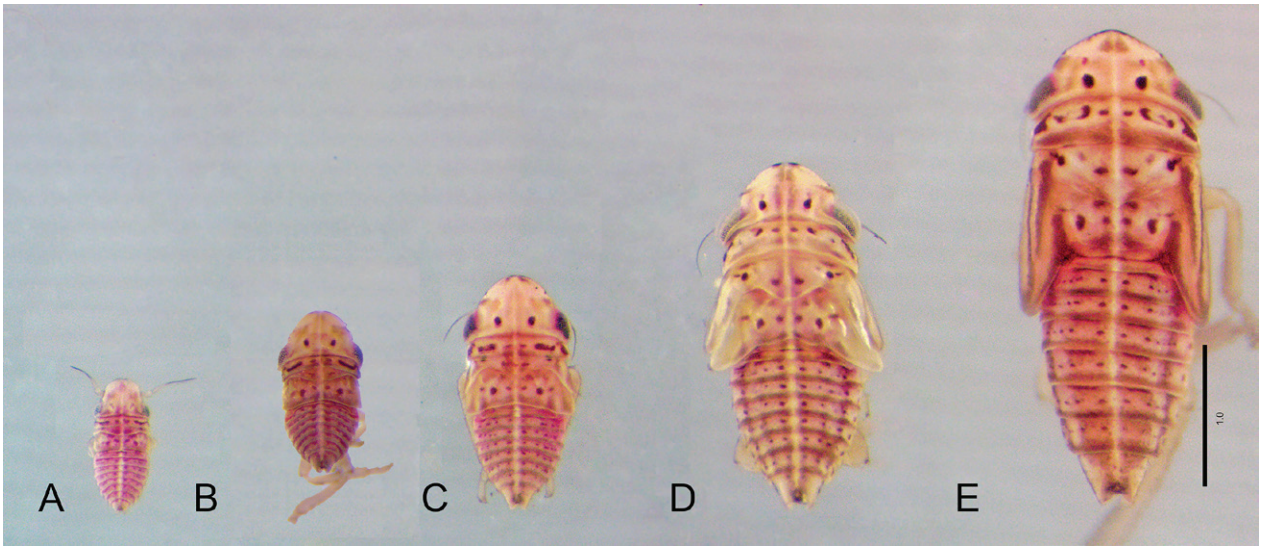

Figure 31. *Ciminius* sp. immature habitus comparison. **A** first instar; **B** second instar; **C** third instar; **D** fourth instar; **E** fifth instar.

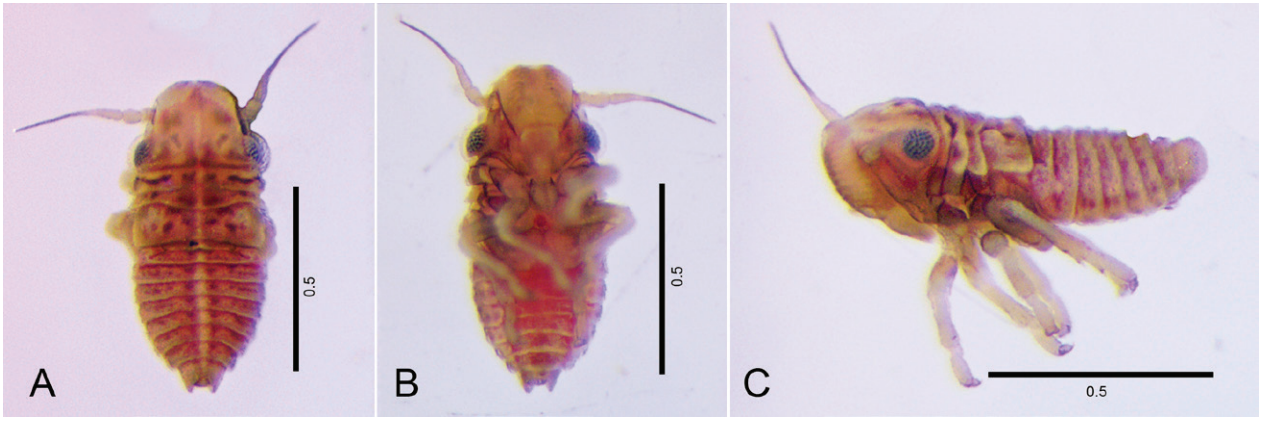

Figure 32. *Ciminius* sp. first instar nymph habitus. **A** dorsal view; **B** ventral view; **C** lateral view. Scale bars in mm.

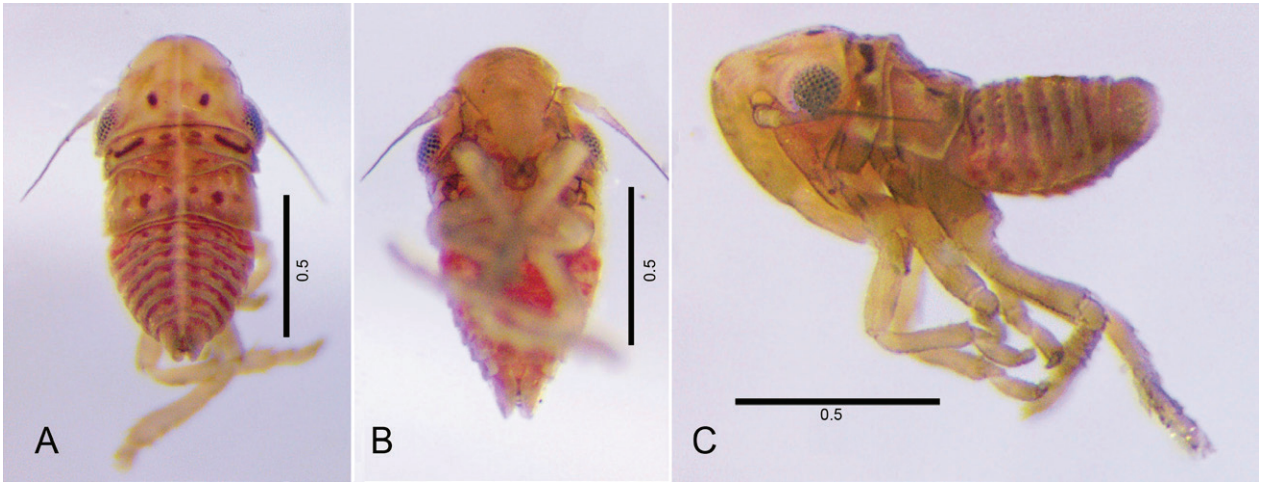

Figure 33. *Ciminius* sp. second instar nymph habitus. **A** dorsal view; **B** ventral view; **C** lateral view. Scale bars in mm.

3rd instar. Overall pale-yellow coloration more homogeneous (Figs 31C, 34), with more distinct darkened macula and marks on head and pronotum. Crown with a faint pair of darkened spots apically. Frons, with marks on muscular impressions and longitudinal whitish band beginning to distinguish; rostrum darkened. Pronotum and metanotum with posterior margin with a transverse smoky stripe. Abdomen with reddish areas smoother and restricted to ventral portion, dorsum with red spots more distinct.

Head (Fig. 34A), in dorsal view, with anterior margin rounded, other features of head as in anterior instar. Pronotum begins to elongate. Mesonotum length of latero-posterior angles almost twice than median lobe length. Metanotum with latero-posterior angles reaching the second abdominal segment, indicating the beginning of wing pads development. Legs (Fig. 34C) structures as in anterior instar, with setae thin, more distinct and elongate. Abdomen (Fig. 34B) with strong segmentation, terminalia as in anterior instar.

4th instar. Overall coloration (Figs 31D, 35) similar to the anterior instar, with black macula on crown and pronotum marks very distinct, wing pads color beginning to distinguish. Frons with muscular impressions very distinct and rostrum darkened. Mesonotum wing pads with three darkened stripes. Metanotum wing pads with an elongated maculae arising from posterior margin and extending anterad. Abdomen reddish marks faded.

Head and thorax (Fig. 35A, B) features as in anterior instar, with ocelli beginning to distinguish. Pronotum (Fig. 35A) length greater than median lobe of mesonotum length. Mesonotum with wing pads developed, almost reaching apex of metanotum wing pads, and attaining abdominal third segment. Legs (Fig. 35C) with setae stouter and distinct. Abdomen (Fig. 35B) with strong segmentation, terminalia sclerotized and conspicuous, with pygofer and ventral parts well distinguished.

5th instar. Overall coloration (Figs 31E, 36) as in anterior instar, with paler areas and maculae similar to adults (see generic description), frons with very distinct and yellowed muscular impressions, with darkened areas around. Mesonotum wing pads with darkened stripes thinner and more defined. Abdomen with well-defined pairs of longitudinal darkened stripes on dorsum, being one broad submedially and one thin, laterally.

Head (Fig. 36A) with anterior margin from broadly rounded to subtriangular, compound eye oval, ocelli distinct, other features as in anterior instar. Pronotum elongate. Mesonotum with median lobe elongate and posteri-

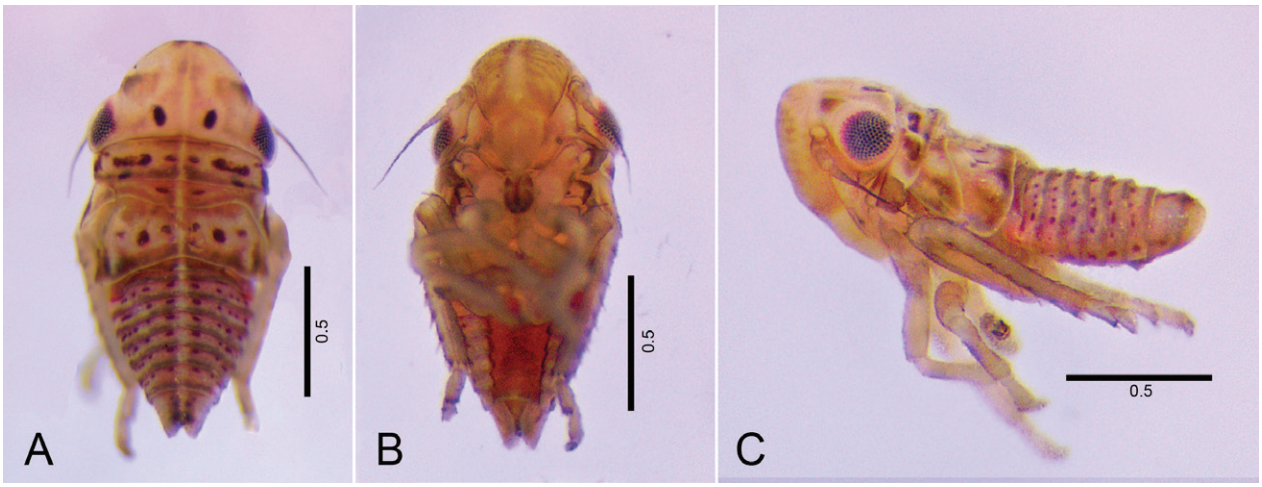

Figure 34. *Ciminius* sp. third instar nymph habitus. **A** dorsal view; **B** ventral view; **C** lateral view. Scale bars in mm.

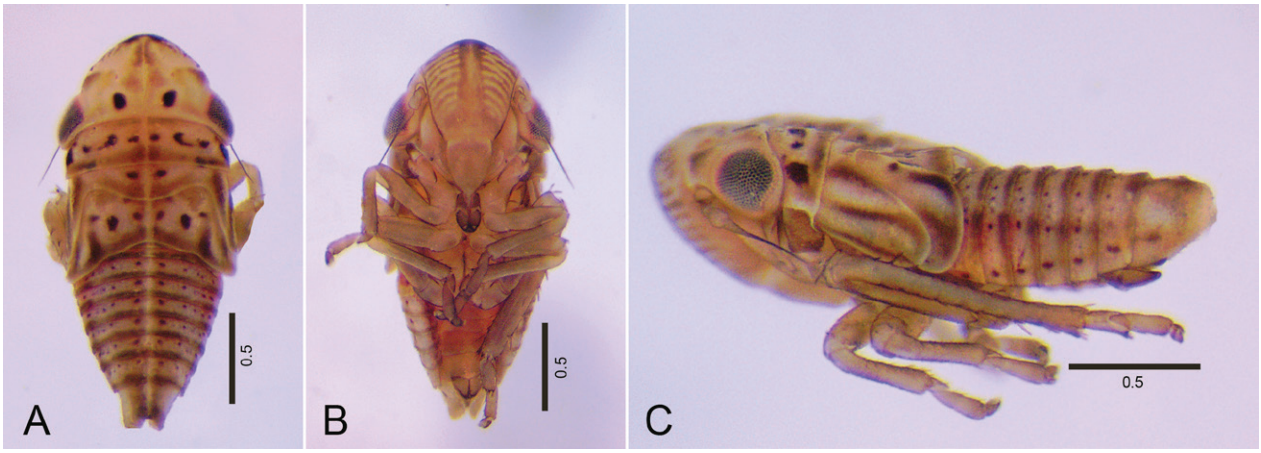

Figure 35. *Ciminius* sp. fourth instar nymph habitus. **A** dorsal view; **B** ventral view; **C** lateral view. Scale bars in mm.

or margin triangular, wing pads well-developed, reaching forth abdominal segment. Metanotum with wing pads well-developed (Fig. 36A, C), slightly longer than mesonotum wing pads. Abdomen (Fig. 36B) with well-developed terminalia and distinct sexes.

Female (Fig. 37A): subgenital plates elongate, with length reaching pygofer apical third, with a complete median slit.

Male (Fig. 37B): subgenital plates short, length not attaining pygofer apical half, with a median slit restricted to apical portion (Marucci et al. 2000).

Remarks. The first and second stages (Fig. 31A, B) are quite similar, but the latter can be differentiated by the following characters: (1) more robust structure of body, especially the head, (2) reddish coloration smoother and restricted to abdomen, (3) metanotum more elongate latero-posteriorly.

The third instar presents the macula and the paler areas on crown and pronotum very distinct (Fig. 33), the overall pale-yellow coloration is more homogeneous as the reddish coloration is fading. But the remarkable characteristics of this stage are: (1) distinction of facial muscular impressions; (2) presence of the setae in hind legs; and (3) beginning of sclerotization and distinction of the terminalia.

The fourth and fifth stages are very similar in overall coloration (Fig. 31D, E) but can be distinguished by the proportion and length of wing pads: in the fourth instar, the wing pads of mesonotum do not attain the apex of metanotum wing pads (Fig. 35A,C), and the latter attains to median third of abdomen third segment (Fig. 36A,C); and in the fifth instar, the mesonotum wing pads tangencies the apex of metanotum wing pads (Fig. 36C), and the latter extends until half-length of fourth abdominal segment.

All the immature specimens were collected with the sweep method and the resulting material was stored with the following precedence label: "Curitiba, Paraná, Brazil, UFPR – Centro Politécnico – Estacionamento, varredura, XII.2022". The *Ciminius* nymphs present the particularity of showing, even at first instar, some of the maculae present in the adults, as the maculae on pronotum and mesonotum, allowing them to an easy recognition at genus level. As the nymph develops, it is possible to note the reddish coloration of abdomen turning into yellow,

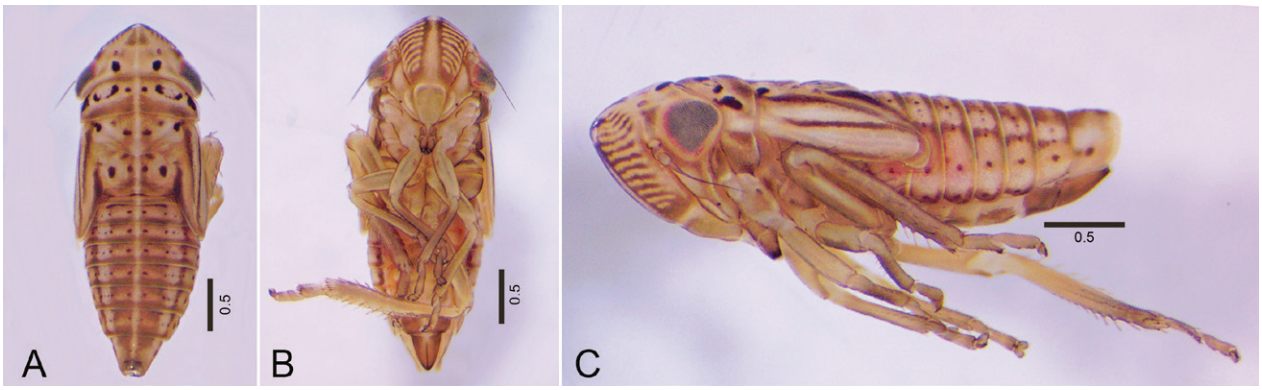

Figure 36. *Ciminius* sp. fifth instar nymph habitus. **A** dorsal view; **B** ventral view; **C** lateral view. Scale bars in mm.

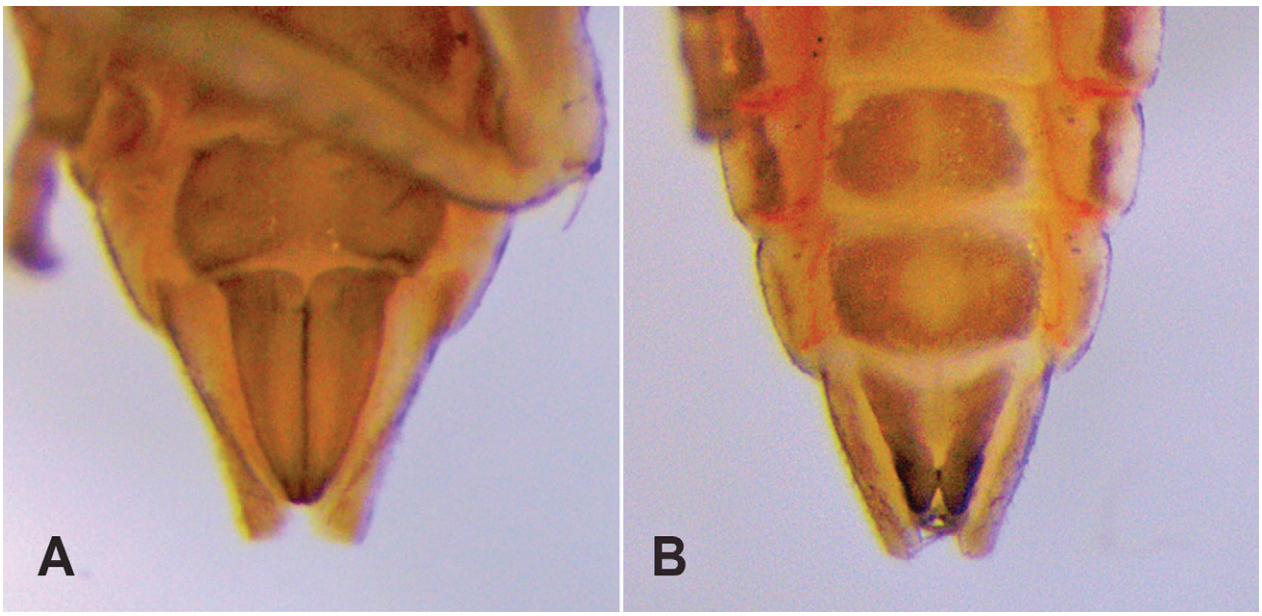

Figure 37. Terminalia of a *Ciminius* sp. fifth instar nymph. **A** female genital capsule; **B** male genital capsule.

which in adults turns into an even more darkened coloration. Some specimens collected, especially in fourth and fifth instars, presented a darkened overall coloration, which could possibly mean to be a black adult. However, in the collection site, there are occurrence of two species, *C. albolineatus* and *C. sesamum* **sp. nov.**, both presenting adults with black overall coloration and therefore was not possible to identify the nymphs species without usage of molecular methods or rearing nymphs, until the emergence of adults.

3.1.2. *Arcanus* gen. nov.

https://zoobank.org/96909607-5341-46FF-89BC-29DA876F7E78

Figure 38

Type species. *Arcanus academicus* **sp. nov.**

Diagnosis. Small sharpshooters, size about 5.5 mm with overall coloration (Fig. 38A–C) reddish with several yellowish spots. Head (Fig. 38A) moderately produced anterad, subtriangular. Forewing (Fig. 38B) with three anteapical cells, middle anteapical cell opened basally,

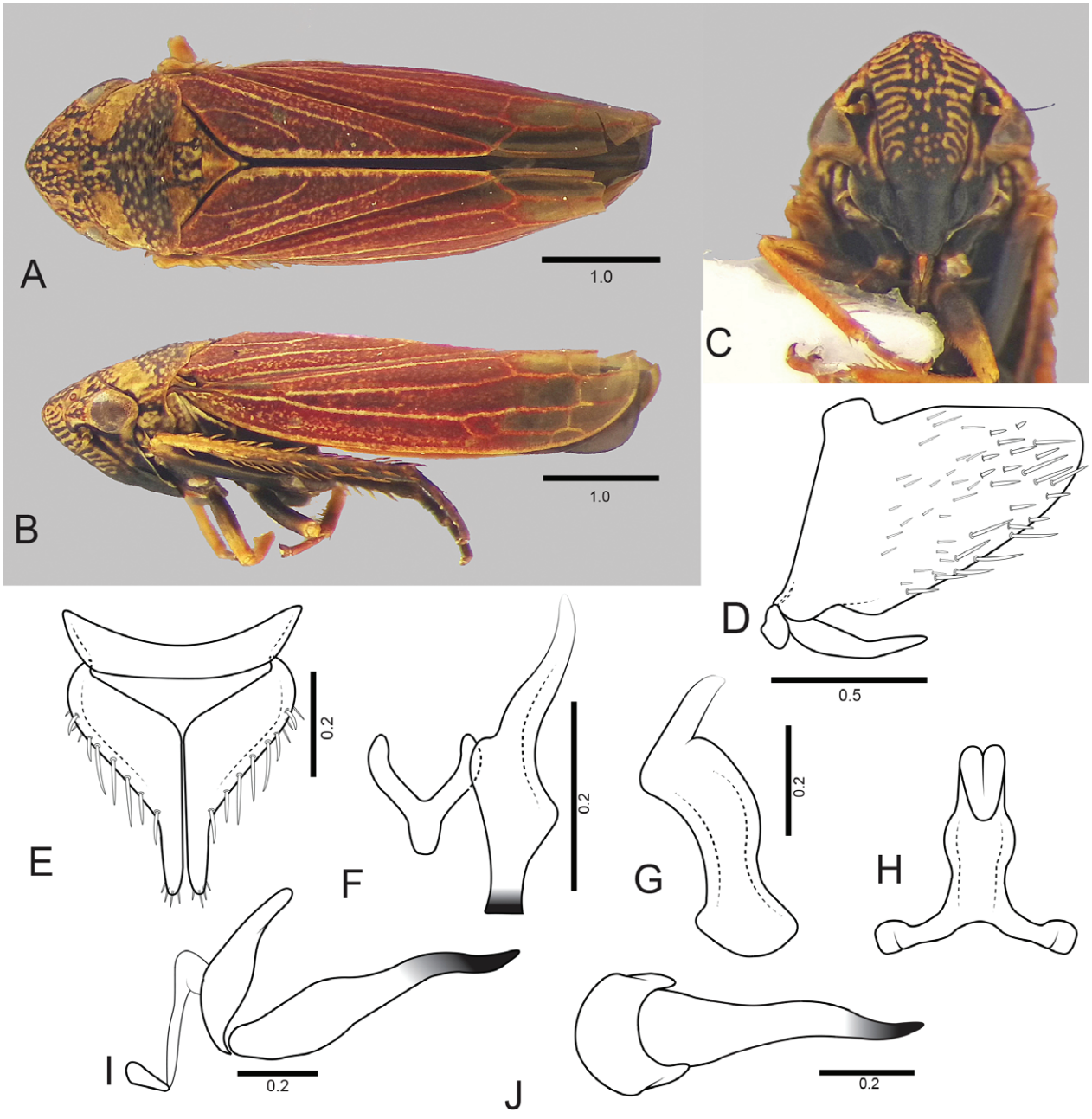

Figure 38. *Arcanus academicus* **gen.** et **sp. nov.**, male holotype. **A** habitus, dorsal view; **B** habitus, lateral view; **C** head, frontal view; **D** pygofer, valve and subgenital plate, lateral view; **E** valve and subgenital plates, ventral view; **F** connective and style, ventral view; **G** aedeagus, lateral view; **H** aedeagus, caudoventral view; **I** connective, stem and paraphysis, lateral view; **J** paraphysis, dorsal view. Scale bars in mm.

some supranumerary veins on apical portion. Connective (Fig. 38I) stem not well sclerotized, articulated with connective. Subgenital plate (Fig. 38D), in lateral view, distinctly short, extending to basal third of pygofer. Aedeagus (Fig. 38G), in lateral view, symmetrical, with shaft short, without processes, in ventral view (Fig. 38H) compressed, apex rounded, opened medially as the gonopore exit. Paraphysis (Fig. 38I, J) with ramus long and robust, well sclerotized apically.

Description. ***Head and Thorax***: Crown (Fig. 38A, B), in dorsal view, anterior margin moderated produced, subtriangular, without concavities between ocelli, surface with texture slightly punctate, with fovea between eyes and ocelli, without a carina on transition from crown to face; median length 1/3 of transocular width, and 1⁄2 of intraocular width. Ocelli located before the imaginary line between anterior eye angles, closer to adjacent eye angle than to median line. Frontogenal suture extending to crown, reaching ocelli. Antennal ledge, in dorsal view, not protuberant; in lateral view (Fig. 38B), rounded, not carinated. Frons (Fig. 38B), in lateral view, slightly oblique, not inflated medially; in frontal view (Fig. 38C), texture slightly punctate, muscular impressions distinct; epistomal suture complete. Clypeus, in frontal view, with apical margin rounded; in lateral view, continuing frons contour, without pubescence. Pronotum (Fig. 38A), in dorsal view, with width slightly greater than transocular width, anterior third with texture slightly punctate, posterior third transversely rugulose, without pubescence; in lateral view (Fig. 38B), dorsopleural carina complete. Mesonotum (Fig. 38A), in dorsal view, slightly punctate anteriorly to transverse sulcus and transversely rugulose posteriorly. Forewing (Fig. 38A, B) opaque, texture slightly punctate, veins distinct and elevated, membrane distinct with four apical cells, which the base of fourth more proximal to base of third than to clavus apex; with three anteapical cells, middle anteapical cell opened basally; with some supernumerary veins on apical portion; appendix narrow. Hind leg (Fig. 38B) with femoral setal formula 2:1:1; first tarsomere shorter than combined length of two more distal tarsomeres, with two parallel longitudinal rows of small setae on plantar surface. Sternite II of abdomen with pair of inner small triangular apodemes. — ***Male terminalia***: Pygofer (Fig. 38D), in lateral view, moderately produced, without processes; dorsal and ventral margins convergent apically; posterior margin rounded; macrosetae distributed along the entire disk; microsetae along posterior margin. Valve (Fig. 38E), in ventral view, slender, anterior margin concave, lateral margins peaked anteriorly. Subgenital plate (Fig. 38E), in ventral view, not fused to its counterparts; triangular, narrowing abruptly towards apex; outer margin with uniseriate row of macrosetae, microsetae present basally; in lateral view (Fig. 38D), short, extending nearly to pygofer basal third. Style (Fig. 38F), in dorsal view, surpassing posteriorly the connective apex; preapical lobe developed and rounded; apex distinctly sclerotized and truncated. Connective (Fig. 38F), in dorsal view, V-shaped, as long as wide, arms slender. Stem of connective (Fig. 38I) occurring as a separate sclerite, long, not well sclerotized, connecting anteriorly to connective and posteriorly to paraphysis arms. Aedeagus (Fig. 38G), in lateral view, symmetrical, directed posteroventrally, without processes; shaft slightly curved ventrally; apex expanded, rounded; in caudoventral view (Fig. 38H), expanded preapically; apical third heart-shaped, with gonopore exit. Paraphysis (Fig. 38I), in lateral view, large, extending nearly to pygofer apex, with a pair of symmetrical arms directed dorsally, articulated with a long robust ramus directed posterodorsally; in dorsal view (Fig. 38J), wide basally and narrowing gradually to an acute and well sclerotized apex.

Female terminalia. Unknown.

Etymology. The genus name *Arcanus* (a neutral noun) is derived from Latin, meaning "mysterious" and "secret." This name alludes to the difficulty of collecting specimens and their remarkable, unique morphological characteristics.

Remarks. *Arcanus* **gen. nov.** shares similarities with *Ciminius* and *Tylozygus*, especially in the male terminalia, such as: (1) pygofer moderately produced, with macrosetae distributed along the entire disk, (2) subgenital plates triangular, short, not extending posteriorly to pygofer basal third (3) styles short with apex truncate (4) stem of connective occurring as a separated sclerite. Although, the new genus can be promptly differentiated from *Ciminius* and *Tylozygus* by the combination of characters below: (1) body somewhat flattened dorsoventrally; (2) head moderately produced, with anterior margin subtriangular; (3) forewings with three anteapical cells, median one opened basally; and (4) paraphysis large and well sclerotized. Until the present moment, *Arcanus* **gen. nov.** is known only for its type location.

Arcanus academicus sp. nov.

https://zoobank.org/3FBAB9C1-1426-40AE-967E-E727F-6C065C2

Figure 38

Diagnosis. Overall coloration (Fig. 38A–C) reddish mottled with yellowish spots on crown, frons and pronotum; forewings reddish, with yellow veins and spots. Aedeagus (Fig. 38G) shaft slightly curved ventrally; apex expanded, rounded. Paraphysis (Fig. 38I), wide basally and narrowing gradually to an acute and well sclerotized apex.

Description. ***Measurements***: Holotype male 5.28 mm; paratype male 5.65 mm. — ***Coloration***: Crown (Fig. 38A), in dorsal view, with black background, mottled with yellow spots, pair of larger black rounded spots behind ocelli, adjacent to posterior margin. Face (Fig. 38C) mostly black, mottled with yellow spots medially and

transverse straps on muscular impressions. Gena black with portion below eye and near lateral margin of frons yellow. Clypeus and lorum without spots. Pronotum (Fig. 38A), in dorsal view, with several yellow spots, anterior third with pair of large transversal yellowish maculae, arising from lateral margins and almost reaching each other medially, posterior margin reddish. Mesonotum (Fig. 38A), in dorsal view, with a pair of orangish triangular maculae laterally, yellowish irregular maculae and spots medially, and orangish posteriorly to transverse sulcus. Forewing (Fig. 38A, B) reddish, with several minute yellow spots, mainly on anterior half; veins yellow, anal margin yellow, apical portion smoky. Thorax (Fig. 38C), in ventral view, black. Legs with basal portion black, distal portion of coxae whitened, distal portions of fore and mid legs and median portions of hind leg yellowish or reddish. Abdomen black, pygofer pale.

Material examined. ***Holotype***: BRAZIL – **Paraná** • ♂; Curitiba, Centro Politécnico, Biológicas parking; 25°26’49”S, 49°13’54”W; 925 m; Dec. 2022; AC Domahovski & L. Alasmar leg.; DZUP. — ***Paratype***: BRAZIL – **Paraná** • 1♂; same data as holotype; DZUP.

Etymology. The epithet “academicus” is from Latin and means “academic”, an allusion to the type locality of the species, Universidade Federal do Paraná.

3.2. Phylogenetic analysis

Figure 39

The data matrix (Supplementary material, Table S1) consisted of 23 taxa and 50 characters, being two of overall coloration, four from head, seven from thorax, 24 from male genitalia and 13 from female genitalia. From these characters, two were coded as multistate and 48 as binaries. In the characters listed below, we provided to each one the number of steps (L), consistency index (ci) and retention index (ri). The monophyly of *Ciminius* was

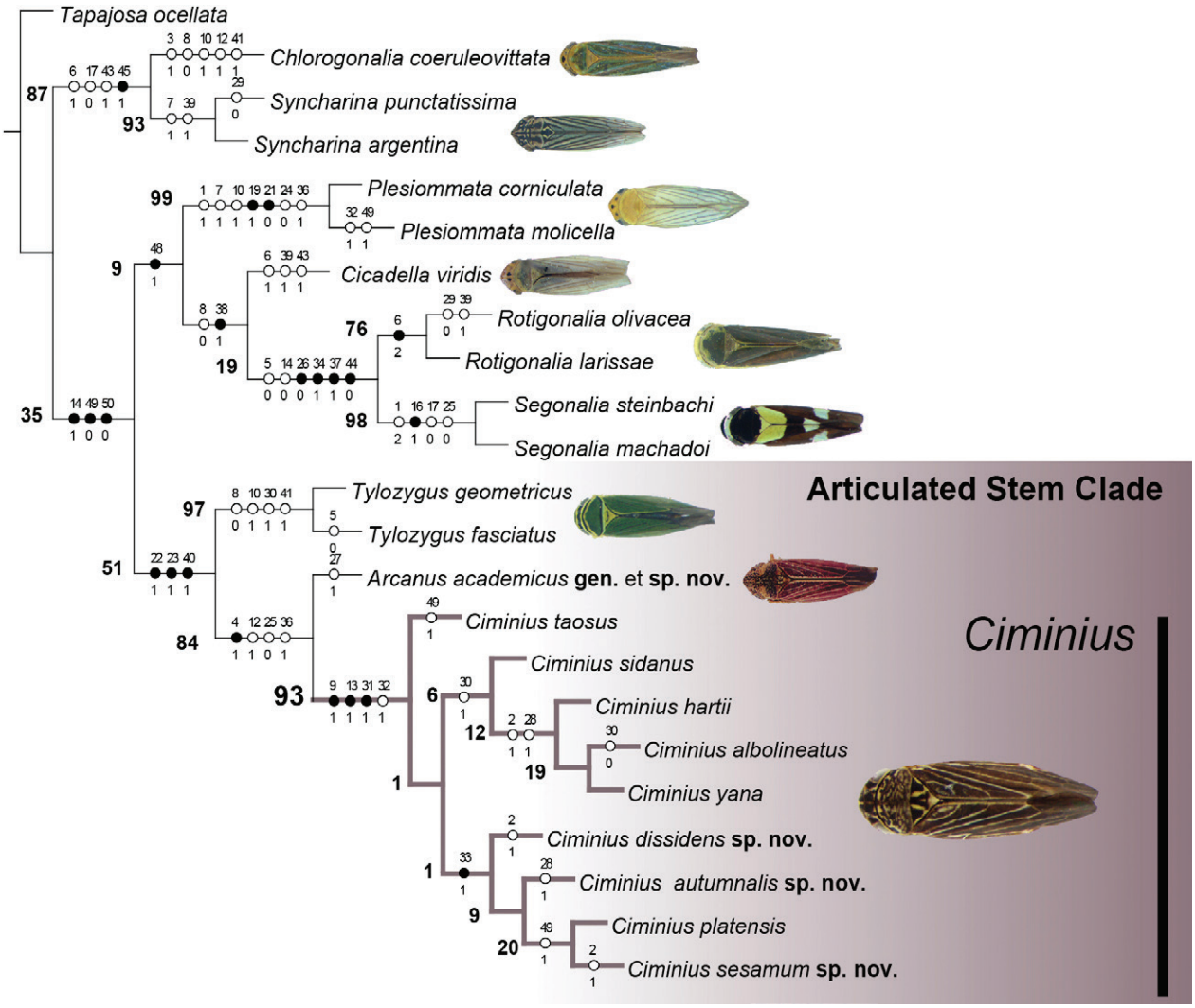

Figure 39. Phylogenetic relationships of *Ciminius*. Cladogram resulted of implied weighting (k = 3; L = 111; Ci = 50; Ri = 79). Symmetric resampling values are marked in front of branches. Unambiguous synapomorphic characters are marked with black circles, while homoplasies with empty circles.

strongly supported, using the implied weighting, with a default K = 3 (SR = 93). Our matrix produced only one tree for implied weighting, with 111 steps, consistence index = 50 and retention index = 79, that will be the hypothesis discussed (Fig. 39). The internal relationships of *Ciminius* were recovered with low support and a sister relationship with *Tylozygus* + (*Arcanus* **gen. nov.** + *Ciminius*), respectively from 48 to 84%.

List of characters

Overall Coloration

1. Overall coloration: **(0)** green (Fig. 40A); **(1)** pale-yellow or brown (Fig. 40B); **(2)** black (Fig. 40C); **(3)** reddish (Fig. 40D). (L:7; ci: 42; ri: 63)

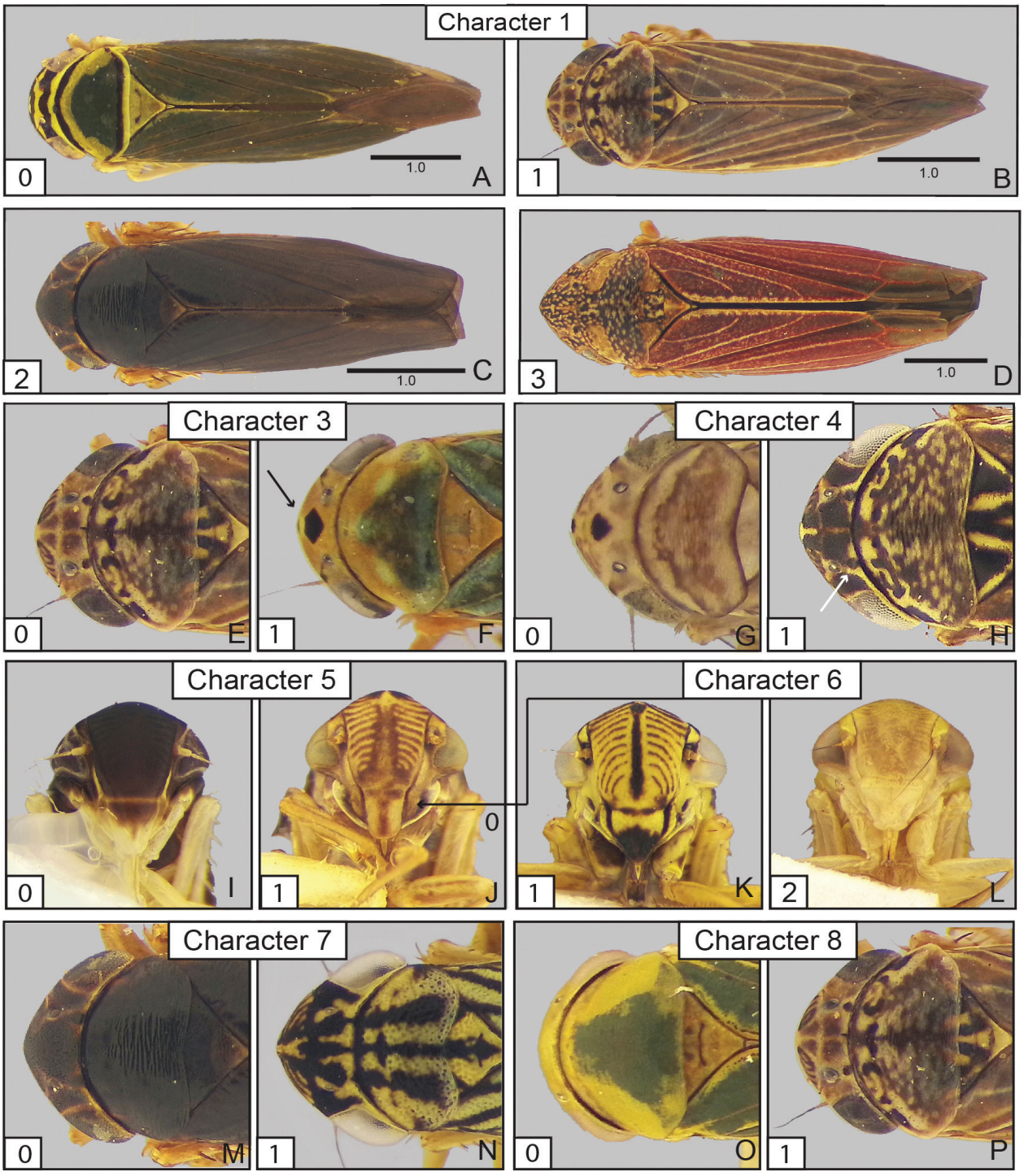

Figure 40. Characters map, states indicated at left bottom square. **A**–**D** habitus in dorsal view: **A** *Tylozygus geometricus*; **B** *Ciminius platensis*; **C** *Ciminius hartii*; **D** *Arcanus academicus* **sp.** et **gen. nov.** **E**–**H** Crown, pronotum and mesonotum, dorsal view: **E** *Ciminius platensis*; **F** *Chlorogonalia coeruleovittata*; **G** *Plesiommata mollicella*; **H** *Ciminius albolineatus*. **I**–**L** Head, frontal view: **I** *Segonalia steinbachi*; **J** *Ciminius platensis*; **K** *Syncharina punctatissima*; **L** *Rotigonalia olivacea*. **M**–**P** Crown and pronotum, dorsal view: **M** *Ciminius hartii*; **N** *Syncharina punctatissima*; **O** *Rotigonalia olivacea*; **P** *Ciminius platensis*. Scales in mm.

2. Overall coloration, polymorphism, presence: **(0)** absent (Figs 8A, 28E); **(1)** present (Figs 5A, 6A). (L:3; ci: 33; ri: 50)

Head

3. Crown, black rounded maculae medially, presence: **(0)** absent (Fig. 40E); **(1)** present (Fig. 40F). (L:3; ci: 33; ri: 33)

4. Crown, posterior margin, pair of dark spots behind ocelli, presence: **(0)** absent (Fig. 40G); **(1)** present (Fig. 40H). (L:1; ci: 100; ri: 100)

5. Frons, muscular impressions, coloration aspect: **(0)** same as frons (Fig. 40I); **(1)** distinct of frons (Fig. 40J). (L:2; ci: 50; ri: 75)

6. Face, clypeus, shape in males: **(0)** flattened (Fig. 40J); **(1)** swollen at base (Fig, 40K); **(2)** lobated at base (Fig. 40L). (L:3; ci: 66; ri: 75)

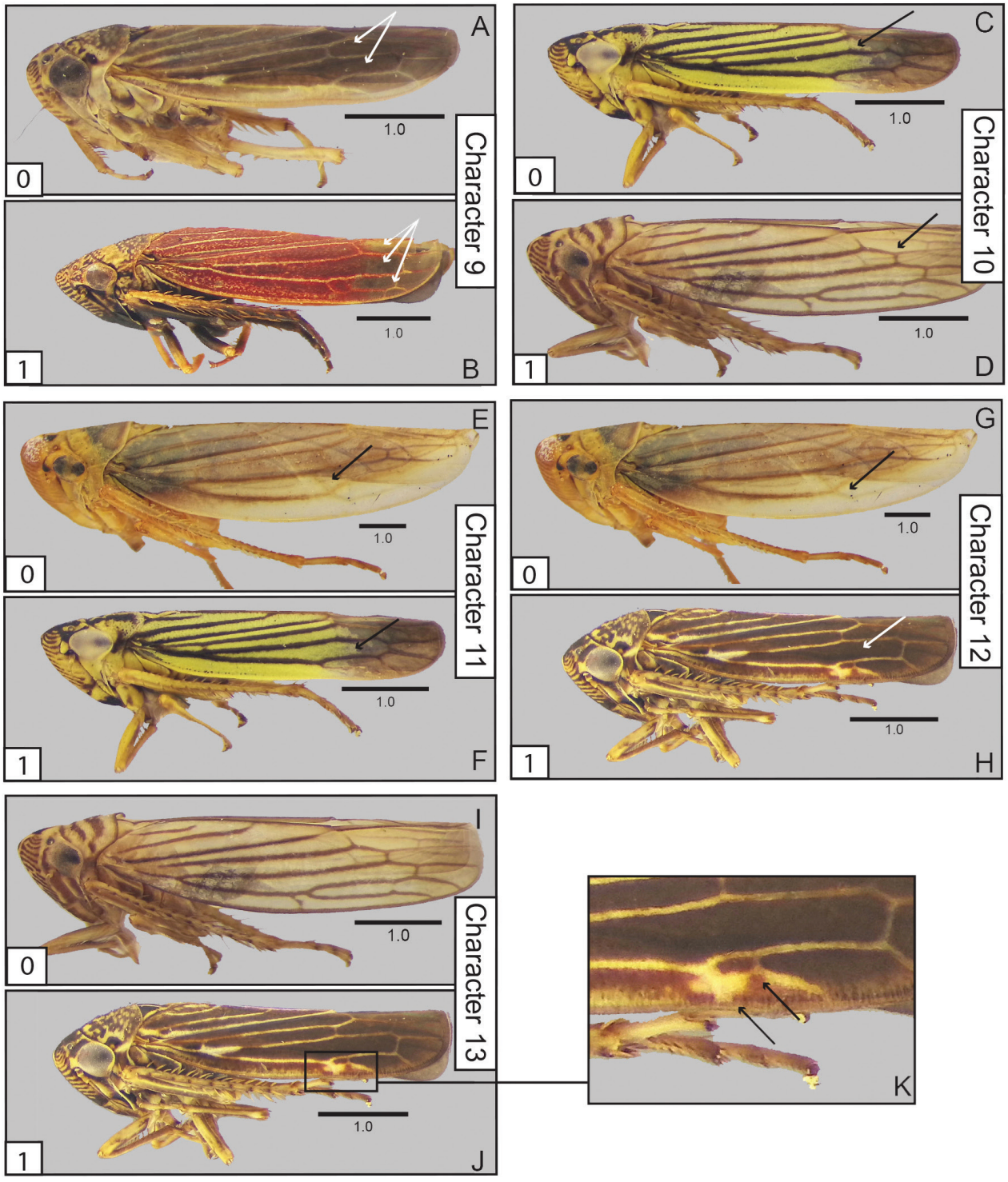

Figure 41. Characters map, states indicated at left bottom square. Arrows indicating the character in specimen. **A**–**J** Habitus, lateral view: **A** *Ciminius platensis*; **B** *Arcanus academicus* **sp.** et **gen. nov.**; **C**, **F** *Syncharina punctatissima*; **D**, **I** *Plesiommata mollicella*; **E, G** *Cicadella viridis*; **H**, **J** *Ciminius albolineatus*; **K** detail of accessory veins. Scales in mm.

Thorax

7. Pronotum, texture: **(1)** strigate (Fig. 40M); **(2)** punctate (Fig. 40N). (L:2; ci: 50; ri: 66)
8. Pronotum, coloration: **(0)** uniform (Fig. 40O); **(1)** contrastingly marked (Fig. 40P). (L:3; ci: 33; ri: 77)
9. Forewing, anteapical cells, number: **(0)** two (Fig. 41A); **(1)** three (Fig. 41B). (L:1; ci: 100; ri: 100)
10. Forewing, inner anteapical cell, aspect of base: **(0)** closed (Fig. 41C); **(1)** opened (Fig. 41D). (L:3; ci: 33; ri: 50)
11. Forewing, median anteapical cell, aspect of base: **(0)** closed (Fig. 41E); **(1)** opened (Fig. 41F). (L:3; ci: 33; ri: 66)
12. Forewing, outer anteapical cell, aspect of base: **(0)** closed (Fig. 41G); **(1)** opened (Fig. 41H). (L:2; ci: 50; ri: 90)
13. Forewing, R1 vein, plexus of anteapical veins, presence: **(0)** absent (Fig. 41I); **(1)** present (Fig. 41J, K). (L:1; ci: 100; ri: 100)

Male abdomen

14. Abdomen, sternite II, inner apodemes, presence: **(0)** absent (Fig. 42A); **(1)** present (Fig. 42B). (L:2; ci: 50; ri: 85)
15. Abdomen, sternite II, inner apodemes, aspect: **(0)** short (Fig. 42C); **(1)** long (Fig. 42D). (L:2; ci: 50; ri: 50)
16. Male pygofer, posterior margin, aspect: **(0)** rounded (Fig. 42E); **(1)** peaked (Fig. 42F). (L:1; ci: 100; ri: 100)
17. Male pygofer, macrosetae, distribution: **(0)** restricted to apical third (Fig. 42G); **(1)** entire disk (Fig. 42H). (L:2; ci: 50; ri: 75)
18. Subgenital plates, length: **(0)** not attaining pygofer apex (Fig. 42I); **(1)** attaining pygofer apex (Fig. 42J). (L:3; ci: 33; ri: 60)
19. Subgenital plates, shape: **(0)** gradually tapering towards apex (Fig. 42K); **(1)** abruptly tapering (Fig. 42L). (L:1; ci: 100; ri: 100)

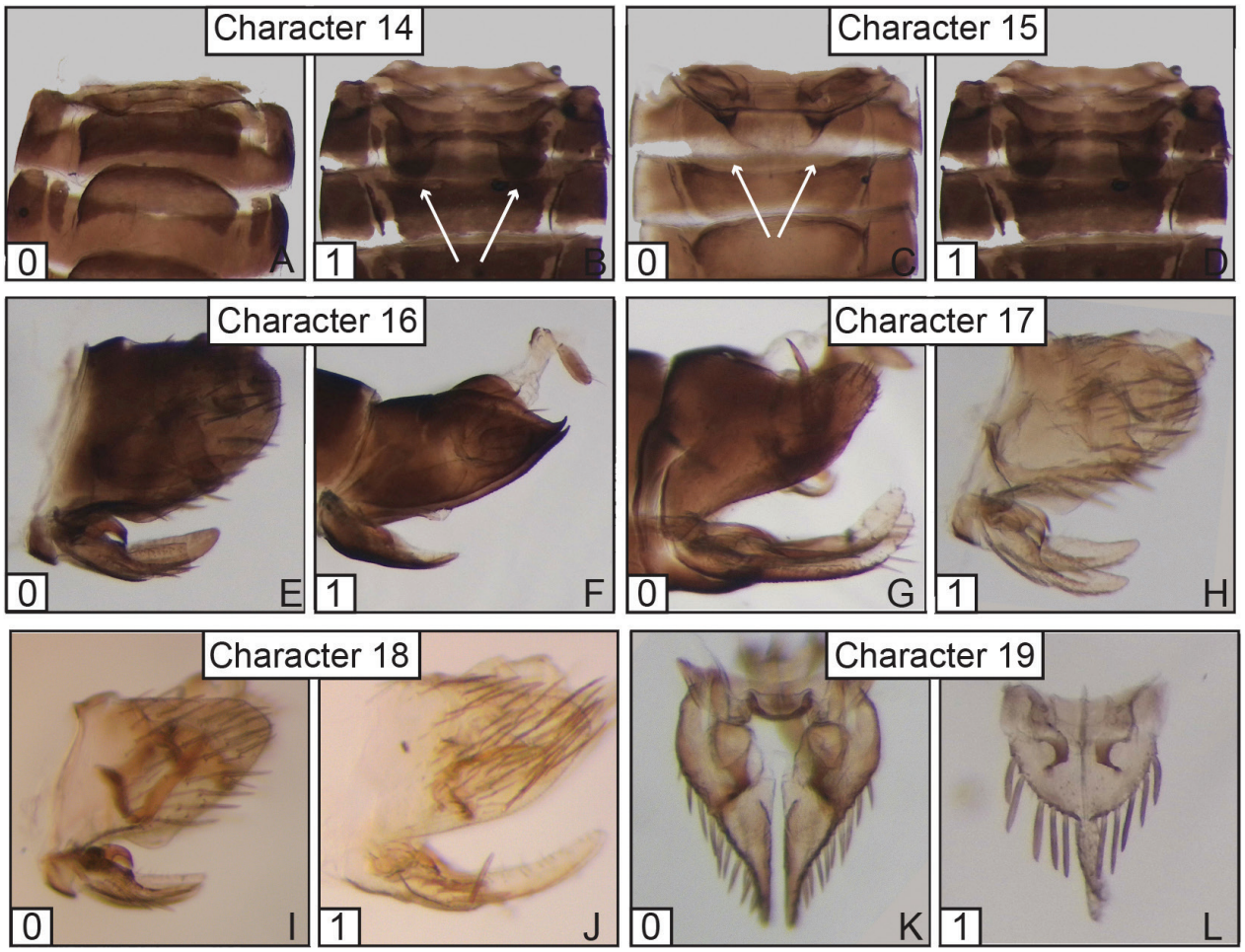

Figure 42. Male abdomen characters map, states indicated at left bottom square. Arrows indicating the character position in specimen. **A**–**D** Abdomen, basal portion in ventral view: **A** *Segonalia steinbachi*; **B**, **D** *Tylozygus geometricus*; **C** *Ciminius hartii*; **E**–**J** Pygofer in lateral view **E** *Ciminius hartii*; **F** *Segonalia steinbachi*; **G** *Syncharina punctatissima*; **H** *Ciminius hartii*; **I** *Ciminius platensis*; **J** *Plesiommata mollicella*; **K**, **L** Subgenital plates, ventral view: **K** *Ciminius hartii*; **L** *Plesiommata mollicella*.

20. Connective, arms, aspect: **(0)** U-shaped (Fig. 43A); **(1)** bar-shaped (Fig. 43B). (L:4; ci: 25; ri: 40)
21. Stem of connective, length: **(0)** shorter than style length (Fig. 43C); **(1)** longer than style length (Fig. 43D). (L:1; ci: 100; ri: 100)
22. Stem of connective, aspect: **(0)** not keeled (Fig. 43E); **(1)** keeled (Fig. 43F). (L:2; ci: 100; ri: 100)
23. Stem of connective, articulation with connective arms, presence: **(0)** absent (Fig. 43G); **(1)** present (Fig. 43H). (L:1; ci: 100; ri: 100)
24. Paraphysis or paraphyses, presence: **(0)** absent (Fig. 43I); **(1)** present (Fig. 43J). (L:2; ci: 50; ri: 50)
25. Paraphysis or paraphyses, number of rami: **(0)** one (Fig. 43K, L) (paraphysis); **(1)** two (Fig. 43M, N). (paraphyses). (L:2; ci: 50; ri: 85)
26. Paraphysis or paraphyses, arm-ramus/rami articulation, presence: **(0)** absent (Fig. 44A); **(1)** present (Fig. 44B). (L:1; ci: 100; ri: 100)
27. Paraphysis or paraphyses, ramus/rami, aspect: **(0)** slender (Fig. 44C); **(1)** robust (Fig. 44D). (L:2; ci: 50; ri: 80)
28. Paraphysis or paraphyses, ventral margin, preapical constriction, presence: **(0)** absent (Fig. 44E); **(1)** present (Fig. 44F). (L:2; ci: 50; ri: 66)
29. Paraphysis or paraphyses, ramus or rami, curvature: **(0)** rectilinear (Fig. 44G); (1) curved (Fig. 44H). (L:5; ci: 20; ri: 33)
30. Paraphysis or paraphyses, ramus or rami in dorsal view, apical third, windings, presence: **(0)** absent (Fig. 44I); **(1)** presence (Fig. 44J). (L:3; ci: 33; ri: 50)
31. Aedeagus – anal tube connection, lobated membrane, presence: **(0)** absent (Fig. 44K); **(1)** present (Fig. 44L). (L:1; ci: 100; ri: 100)
32. Aedeagus, basidorsal margin, aspect: **(0)** not expanded (Fig. 45A); **(1)** expanded (Fig. 45B). (L:2; ci: 50; ri: 88)
33. Aedeagus, ventral margin, serrated processes, presence: **(0)** absent (Fig. 45C); **(1)** present (Fig. 45D). (L:1; ci: 100; ri: 100)
34. Aedeagus, apical process/processes, presence: **(0)** absent (Fig. 45E); **(1)** present (Fig. 45F). (L:1; ci: 100; ri: 100)
35. Aedeagus, apical process/processes, number: **(0)** one (Fig. 45G); **(1)** two (Fig. 45H). (L:1; ci: 100; ri: 100)
36. Aedeagus, apical third, aspect: **(0)** continuing or slenderer than shaft contour (Fig. 45I); **(1)** expanded (Fig. 45J). (L:4; ci: 25; ri: 62)
37. Aedeagus, apex, shape: **(0)** rounded (Fig. 45K); **(1)** acute (Fig. 45L). (L:1; ci: 100; ri: 100)

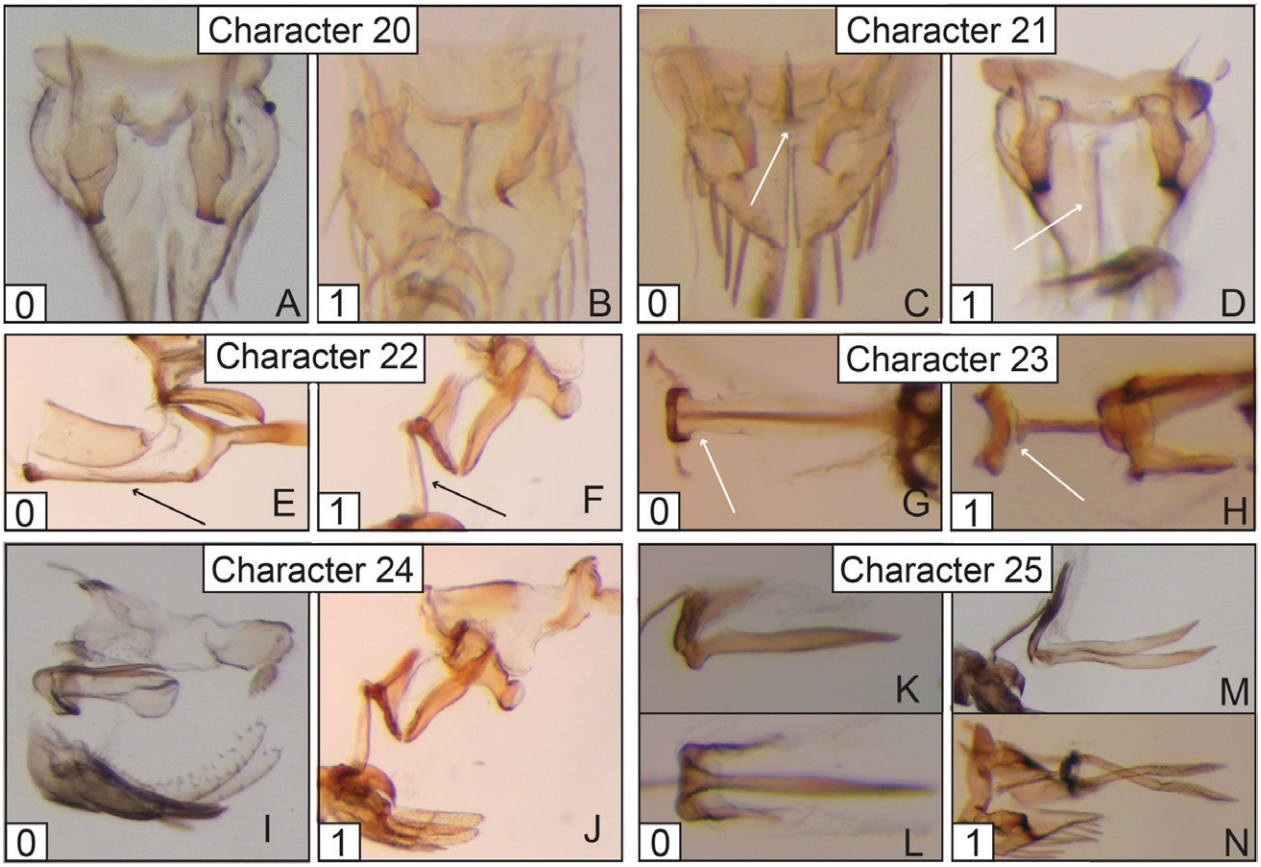

Figure 43. Male abdomen characters map, states indicated at left bottom square. Arrows indicating the character position in specimen. **A**–**D** connective and styles, dorsal view. **A** *Ciminius sidanus*. **B** *Chlorogonalia coeruleovittata*. **C** *Plesiommata mollicella*. **D** *Tylozygus geometricus*. **E**, **F** connective, paraphysis and aedeagus, lateral view. **E** *Rotigonalia olivacea*. **F** *Ciminius platensis*. **G**, **H** connective and stem, dorsal view. **G** *Rotigonalia olivacea*. **H** *Ciminius platensis*. **I**, **J** internal structures of male genitália. **I** *Plesiommata mollicella*. **J** *Ciminius platensis* **K**–**N** paraphysis, lateral and dorsal view, respectively: **K**, **L** *Ciminius sesamum* **sp. nov.**; **M**, **N** *Tylozygus geometricus*.

Female abdomen

38. Female sternite VII, proportion: **(0)** as long as wide (Fig. 46A); **(1)** longer than wide (Fig. 46B). (L:1; ci: 100; ri: 100)

39. Female pygofer, apex, aspect: **(0)** rounded (Fig. 46C); **(1)** triangular (Fig. 46D). (L:3; ci: 33; ri: 33)

40. Valvifer I, shape: **(0)** suboval (Fig. 46E); **(1)** rounded (Fig. 46F). (L:1; ci: 100; ri: 100)

41. Valvula I of ovipositor, truncated process, pre basally, presence: **(0)** absent (Fig. 46G); **(1)** present (Fig. 46H). (L:2; ci: 50; ri: 50)

42. Valvula I of ovipositor, apical portion, aspect: **(0)** gradually narrowed towards apex (Fig. 46I); **(1)** abruptly narrowed towards apex (Fig. 46J). (L:2; ci: 50; ri: 80)

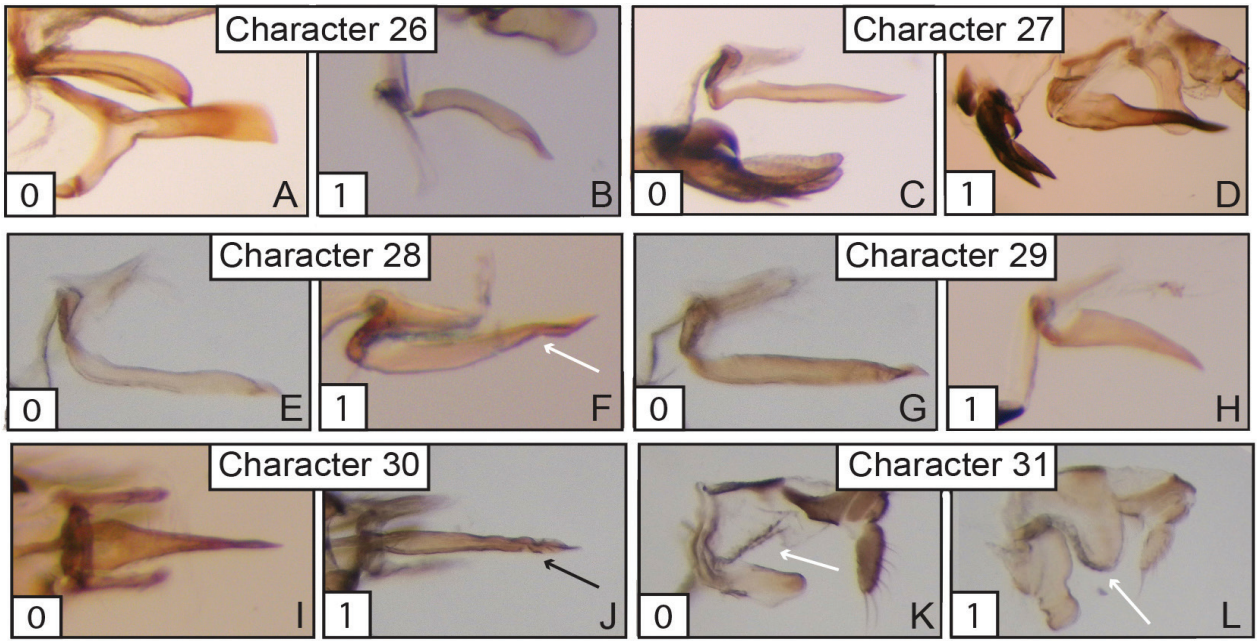

Figure 44. Paraphysis and anal tube characters map, states indicated at left bottom square. Arrows indicating the character position in specimen. **A**–**H** paraphysis, lateral view: **A** *Rotigonalia olivacea*; **B** *Ciminius yana*; **C** *Ciminius sesamum* **sp. nov.**; **D** *Arcanus academicus* **sp.** et **gen. nov.**; **E** *Ciminius sidanus*; **F** *Ciminius autumnalis* **sp. nov.**; **G** *Ciminius hartii*; **H** *Ciminius dissidens* **sp. nov. I**, **J** Paraphysis, dorsal view: **I** *Ciminius platensis*; **J** *Ciminius hartii*. **K**, **L** Aedeagus and anal tube, lateral view: **K** *Tylozygus geometricus*; **L** *Ciminius sidanus*.

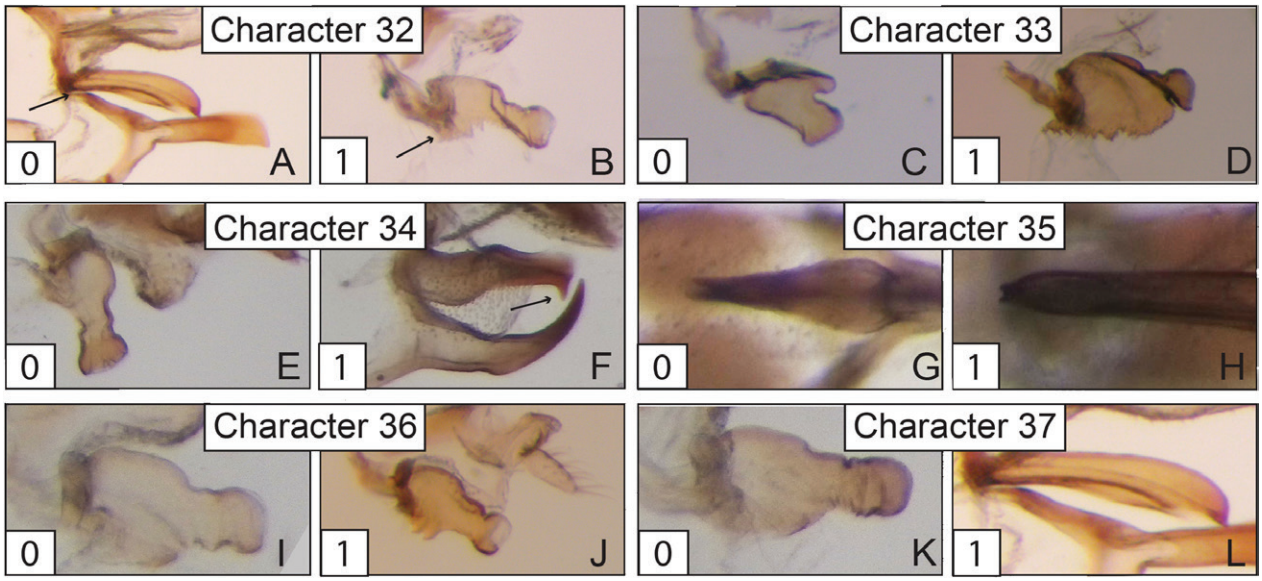

Figure 45. Aedeagus characters map, states indicated at left bottom square. Arrows indicating the character position in specimen: **A**–**F** aedeagus, lateral view; **A** *Rotigonalia olivacea*; **B** *Ciminius sesamum* **sp. nov.**; **C** *Ciminius yana*; **D** *Ciminius dissidens* **sp. nov.**; **E** *Ciminius hartii*; **F** *Segonalia steinbachi*. **G**–**H** Aedeagus apex, ventral view: **G** *Segonalia steinbachi*; **H** *Rotigonalia olivacea*. **I**–**L** Aedeagus, lateral view: **I** *Ciminius sidanus*; **J** *Ciminius platensis*; **K** *Ciminius taosus*; **L** *Rotigonalia olivacea*.

43. Valvula I of ovipositor, dorsal margin sculpting, shape: **(0)** strigate (Fig. 46K); **(1)** scale-like (Fig. 46L). (L:2; ci: 50; ri: 66)

44. Valvula II of ovipositor, expansion after basal curvature, aspect: **(0)** slight (Fig. 47A); **(1)** distinct (Fig. 47B). (L:1; ci: 100; ri: 100)

45. Valvula II of ovipositor, blade apex, direction: **(0)** horizontal (Fig. 47C); **(1)** posterodorsal (Fig. 47D). (L:1; ci: 100; ri: 100)

46. Valvula II of ovipositor, apex, aspect: **(0)** broad (Fig. 47E); **(1)** narrowed (Fig. 47F). (L:4; ci: 25; ri: 57)

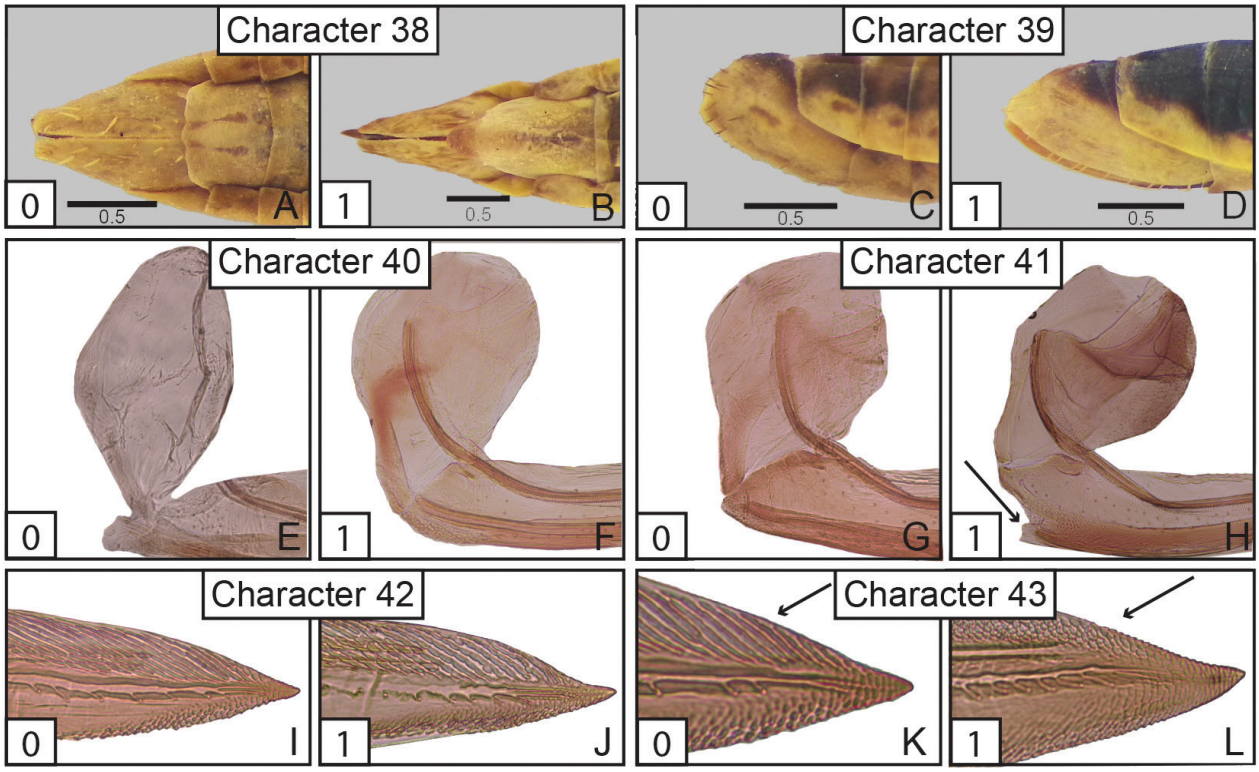

Figure 46. Female abdomen characters map, states indicated at left bottom square. Arrows indicating the character position in specimen: **A**, **B** pygofer, ventral view: **A** *Ciminius platensis*; **B** *Rotigonalia olivacea*. **C**, **D** Pygofer, lateral view: **C** *Ciminius platensis*; **D** *Syncharina punctatissima*. **E**–**H** First valvifer and valvula I basal portion, lateral view: **E** *Chlorogonalia coeruleovittata* **F** *Ciminius yana*; **G** *Ciminius platensis*; **H** *Tylozygus geometricus*. **I**–**L** Valvula II apex, lateral view: **I** *Ciminius platensis*; **J** *Tylozygus geometricus*; **K** *Ciminius platensis*; **L** *Syncharina punctatissima*. Scales in mm.

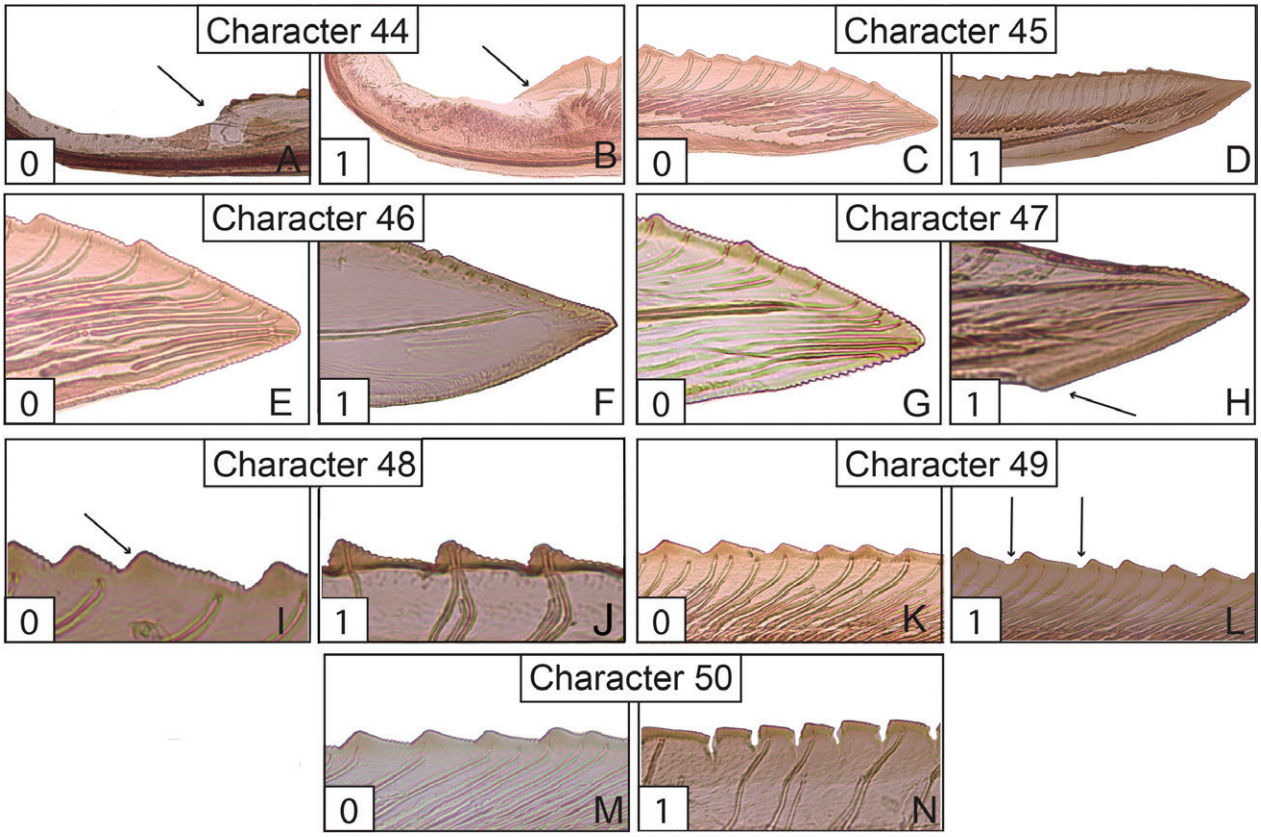

Figure 47. Female valvula II characters map, states indicated at left bottom square. Arrows indicating the character position in the specimen. **A**, **B** Valvula II basal portion, lateral view: **A** *Rotigonalia olivacea*; **B** *Ciminius platensis*. **C**, **D** Valvula II apical portion, lateral view: **C** *Ciminius platensis*; **D** *Syncharina punctatissima*; **E**–**H** Valvula II apex, lateral view: **E** *Ciminius platensis*; **F** *Syncharina argentina*; **G** *Ciminius albolineatus*; **H** *Rotigonalia olivacea*. **I**–**N** Valvula II median portion of blade, denticles details, lateral view: **I** *Ciminius sesamum*; **J** *Rotigonalia olivacea*; **K** *Ciminius autumnalis* **sp. nov.**; **L** *Ciminius sesamum* **sp. nov.**; **M** *Ciminius hartii*; **N** *Chlorogonalia coeruleovittata*.

47. Valvula II of ovipositor, preapical prominence on ventral margin, presence: **(0)** absent (Fig. 47G); **(1)** present (Fig. 47H). (L:2; ci: 50; ri: 85)

48. Valvula II of ovipositor, primary teeth anterior margin, denticles, presence: **(0)** absent (Fig. 47I); **(1)** presence (Fig. 47J). (L: 1; ci: 100; ri: 100)

49. Valvula II of ovipositor, gap between primary teeth, presence: **(0)** absent (Fig. 47K), **(1)** present (Fig. 47L). (L:4; ci: 25; ri: 57)

50. Valvula II of ovipositor, primary teeth at median portion, shape: **(0)** subtriangular (Fig. 47M); **(1)** inclined trapezoid (Fig. 47N). (L:1; ci: 100; ri: 100)

3.3. Occurrence map

Figures 48, 49

The species *Ciminius hartii* has its distribution in both Nearctic and Neotropical regions. Amongst the Nearctic species, *Ciminius hartii* is the most abundant, appearing in several studies, checklists, museum catalogs, and in online platforms. They have a spread distribution in the south region of the United States, while the other Nearctic species, *C. sidanus* and *C. taosus* occur only in some states, the latter being recorded only from Texas (Fig. 48).

The two most abundant Neotropical species, based on the examined material, belong to *C. albolineatus* and *C. platensis*, showing a wide distribution in Brazil. According to our results, there is a lack of *Ciminius* occurrence in Brazil's Northern region, which can be explained by the low amount of material samples from this area (Fig. 48). All the Neotropical *Ciminius* species coexist in the eastern region of Paraná State, maybe explained due to a large collection effort made for this study, and for this reason we provided a map in detail for each species (Fig. 49). Two of the new species were collected in the open fields of grasslands, in conserved sites used for this study: Parque Estadual (P.E.) Vila Velha and Parque Estadual do Guartelá. The species *Ciminius autumnalis* **sp. nov.** is registered for both localities, while *C. dissidens* **sp. nov.** is registered only for the former. Until the present moment, these species distributions are restricted to these localities. Meanwhile, *C. albolineatus* occurs in P.E. Guartelá and P.E. Vila Velha and *C. platensis* occur in P.E. Vila Velha. The third new species, *Ciminius sesamum* **sp. nov.**, was collected in São José dos Pinhais and in the gardens of Centro Politécnico, where our study was conducted. This location also presents reminiscents of Atlantic Forest and Grasslands, although it is an anthropized area. The species *C. albolineatus* and *C. platensis* are also abundant in this location. *Ciminius yana* was collected on

Figure 48. *Ciminius* occurrence map. *Ciminius callosa* male allotype represented in another symbol, as we do not recognize it belonging to the species.

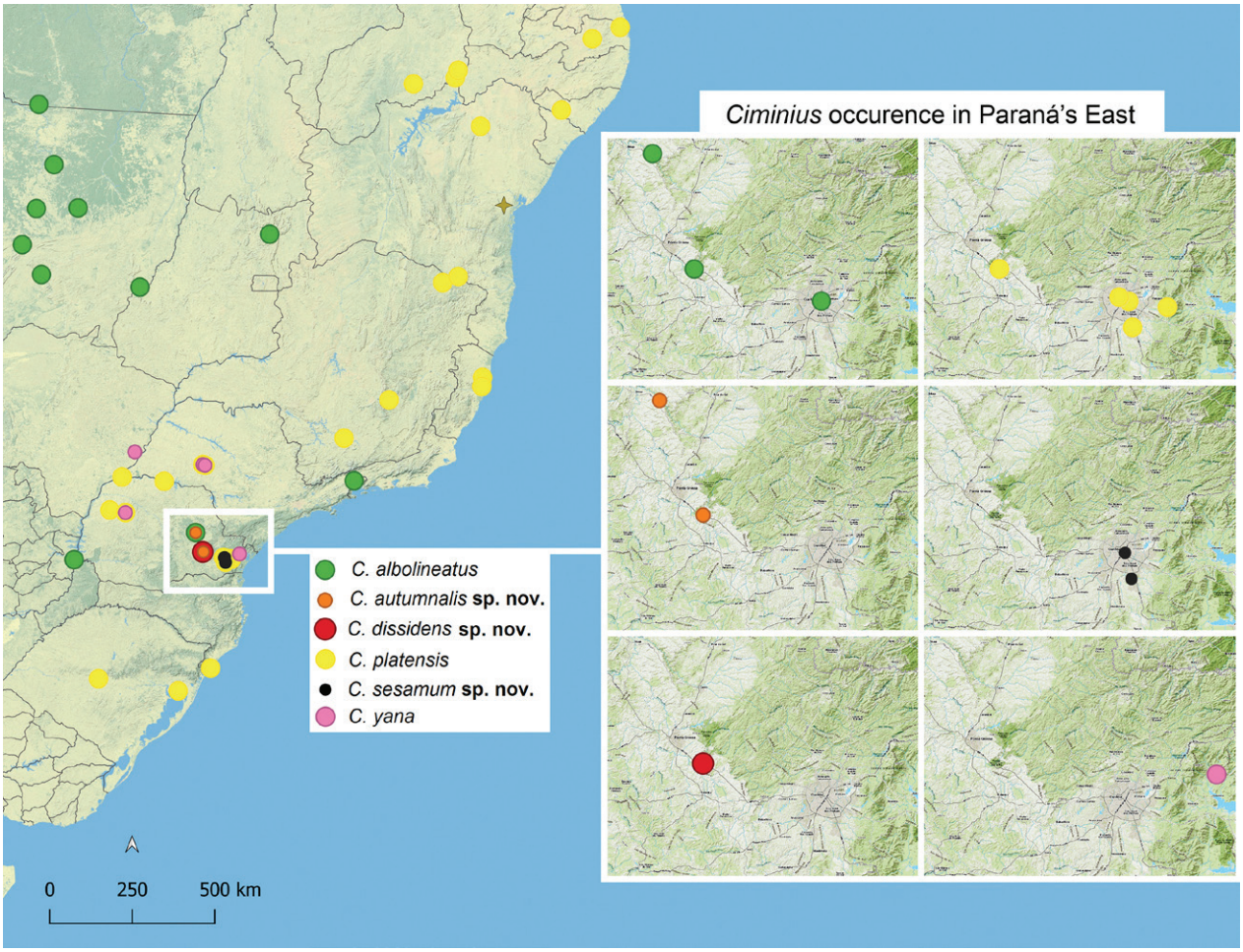

Figure 49. Occurrence of *Ciminius* in the East region of Paraná State, with emphasis in the Neotropical species.

conserved areas such as Reserva Particular do Patrimônio Natural (R.P.P.N) Guaricica, however, specimens were collected also in anthropized areas such as farmsteads or alongside roads.

3.4. Parasitism notes

Figure 50

Nymphs and adults of Cicadellidae are reportedly attacked by Dryinidae, Encyrtidae (Hymenoptera), Pipunculidae (Diptera), Halictophagidae and Helenchidae (Strepsiptera) (Virla 2000, Kathirithamby 2018, Domahovski et al. 2024). But, particularly for Cicadellini, these records are scarce, although members of this tribe are frequently found parasitized by Strepsiptera in entomological collections, this type of record is rarely reported (e.g. Mejdalani et al. 2019, Domahovski et al. 2024). Here, we report adults of *C. albolineatus*, *C. autumnalis* **sp. nov.**, *C. dissidens* **sp. nov.**, *C. platensis*, *C. sesamum* **sp. nov.**, and *C. yana* parasitized or superparasitized by Strepsiptera. These parasitoids seem not to prefer male or female, but preference for adults can be hypothesized, since we did not find parasitized nymphs. In some cases, it is possible to notice a reduction or displacement of the host's genital capsule.

3.5. Submacroptery report

Figure 51

A total of 133 females of *Ciminius sesamum* **sp. nov.** were studied, of which 85 were submacropterous (~64%), being the first record to the genus. Interestingly, we found no male presenting this feature, or in any other species of *Ciminius*. Submacroptery seems to be a rare condition amongst Cicadellinae and was only reported in *Oragua* Young, 1977 and *Teleogonia* Melichar, 1925 for the Cicadellini tribe and in *Splonia* Signoret, 1851 for Proconini. Submacroptery by definition is when the forewing is somewhat shortened, exposing genital capsule up to one or two segments, with appendix reduced or absent (Zahniser 2021). The females at hand showed a distinct abdominal distention, with the genital capsule exposed

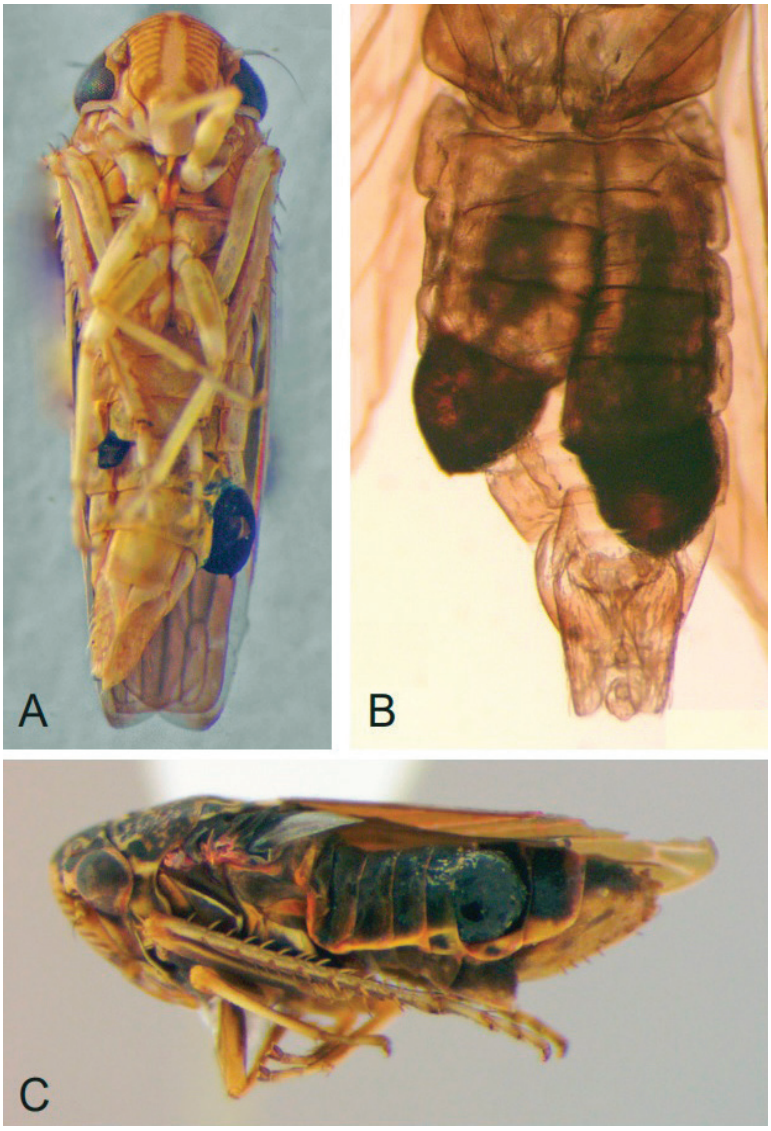

Figure 50. Records of parasitism by Strepsiptera in *Ciminius*. **A** *C. platensis* superparasitized, in ventral view; **B** *C. platensis* superparasitized, with abdomen clarified, in ventral view; **C** female of *Ciminius dissidens* **sp. nov.**, in lateral view.

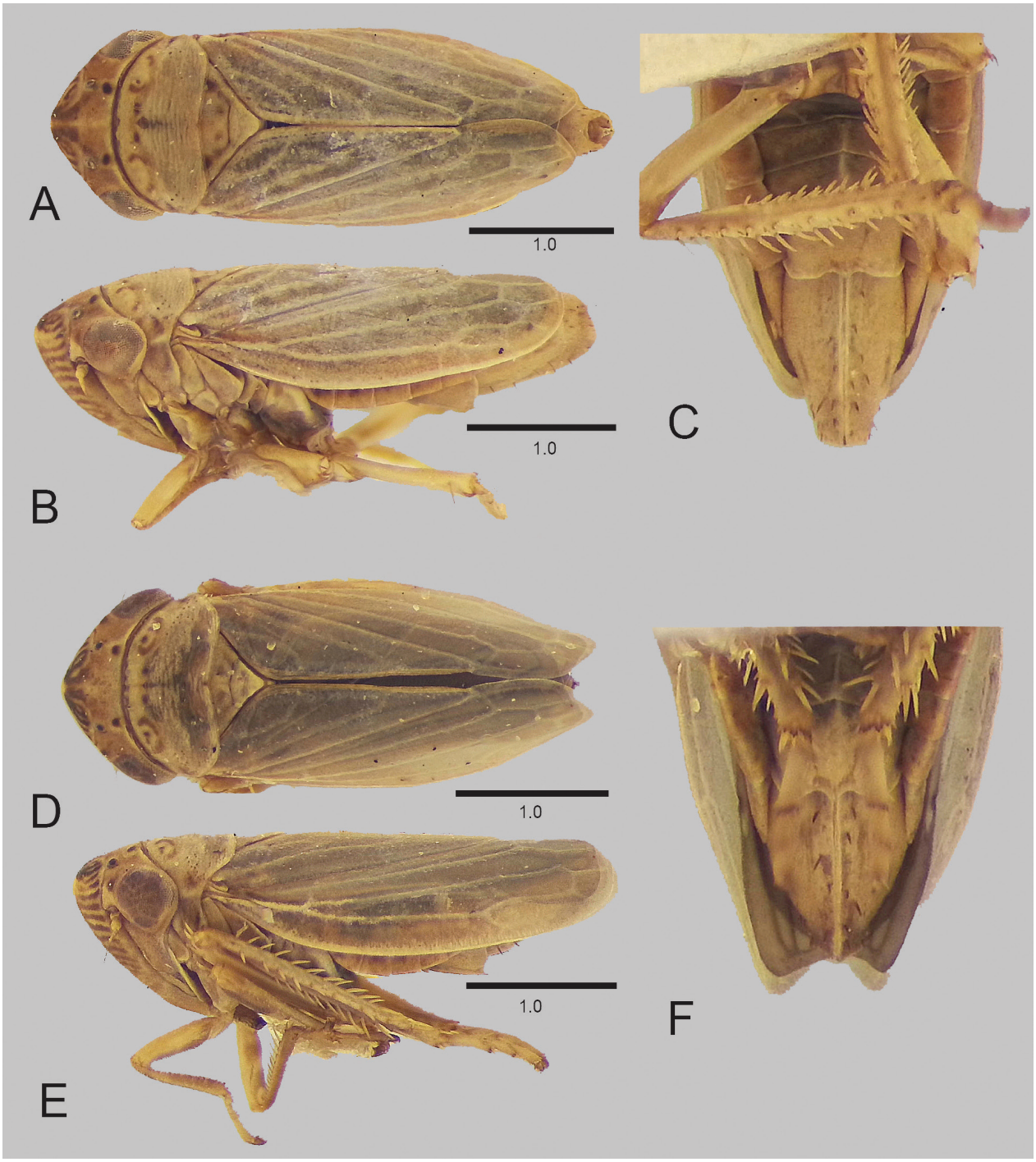

Figure 51. *Ciminius sesamum* **sp. nov.** female, dorsal and lateral habitus, terminalia in ventral view, respectively. **A**–**C** Specimen with submacropterous condition; **D**–**F** macropterous specimen. Scale bars in mm.

which could have been related to parasitism at first, as discussed above. However, not all the females with the supposed distention were parasitized. When further analyzing the specimens, not only the genital capsule was exposed, but the apical cells of the forewing were shortened compared to an average male, implicating in a reduction of the forewing length, which means the submacropteous condition at definition.

4. Discussion

In our phylogenetic analysis, all genera compounding the outgroup were recovered with strong support: *Syncharina* (SR = 93), *Plesiommata* (SR = 99), *Rotigonalia* (SR = 76), *Segonalia* (SR = 98) and *Tylozygus* (SR = 97). *Ciminius* was recovered as monophyletic (SR = 94), sup-

Figure 52. *Ciminius* collections localities: **A** Centro Politécnico, Universidade Federal do Paraná, Curitiba, Paraná State; **B** Marília, São Paulo State; **C** Parque Estadual de Vila Velha, Ponta Grossa, Paraná State.

ported by three unambiguous synapomorphies: the forewings with two anteapical cells (9-1) (Fig. 41A), with a plexus of additional R1 veins (13-1) (Fig. 41J, K); and the anal tube–aedeagus membrane lobated (31-1) (Fig. 44L). This clade was also supported by one homoplastic character: aedeagus basidorsal margin expanded (32-1) (Fig. 33B), shared with *Plesiommata mollicella* (Fig. 43I).

Our analysis recovered *Arcanus academicus* **gen.** et **sp. nov.** as sister of *Ciminius*, with a high support (SR = 84), with one synapomorphy: the crown bearing a pair of black spots behind the ocelli (4-1) (Figs 38A, 40H) and three homoplastic characters: forewing with outer anteapical cell opened basally (12-1) (Figs 28B, 41H), paraphysis with one ramus (25-0) (Figs 38I, J, 43K, L) and aedeagus with apical third expanded (36-1) (Figs 38H, 45J). Based on these results and the strong differences in the overall coloration, genitalia and external morphology when compared to the species of *Ciminius* and *Tylozygus*, we propose a new genus to include this single species.

Tylozygus was recovered as sister of the clade *Ciminius* + *Arcanus* **gen. nov.**, with moderate support (SR = 51), supported by three unambiguous synapomorphies: stem of connective keeled (22-1) (Fig. 43F), articulated with connective (23-1) (Fig. 43H), and aspect of valvifer I of ovipositor rounded (40-1) (Fig. 46F). The peculiarity of having the connective stem articulated as a separate sclerite appears only in these three genera, being a synapomorphy on this analysis and a good diagnostic feature for this clade amongst all Cicadellini genera. For this reason, this clade was nominated here as Articulated Stem Clade. Due to the similarities between the three genera, it seems feasible that *Arcanus* **gen. nov.** could also be included in the *Cicadella* group of genera proposed by Young (1977).

The *Ciminius* internal relationships were mostly defined by few characters of the male genitalia, once all the species have external morphology strongly conserved, resulting in clades recovered with low support. The species of Ciminius can be divided into two groups, the paraphyletic group "Without Processes", due to the sister group relationship of *C. taosus* to the other *Ciminius*, and also composed by the clade *C. sidanus* + (*C. hartii* + (*C. albolineatus* + *C. yana*)), which share the ventral margin of aedeagus smooth, and the monophyletic group "Serrated Processes", due to the ventral margin of aedeagus with serrated processes, composed of *Ciminius dissidens* **sp. nov.** + (*C. autumnalis* **sp. nov.** + (*C. platensis* + *C. sesamum* **sp. nov.**)). The group "Without Processes" was recovered with very low support (SR = 6), sharing one homoplasy: the paraphysis in dorsal view with windings in apical portion (30-1) (Fig. 44J), a state reversed in *C. albolineatus* (Fig. 2J). The species *C. hartii* were recovered as sister to (*C. albolineatus* + *C. yana*), with very low support (SR = 12) and two homoplastic characters: color polymorphism (2-1) and paraphysis with a preapical constriction (28-1) (Fig. 35F). The species *C. albolineatus* and *C. yana* were recovered as sisters, with low support (SR = 19). The Clade "Serrated Processes" were recovered with very low support (SR = 1), and with one synapomorphy: aedeagus ventral margin with serrated processes (33-1) (Fig. 45D). *Ciminius dissidens* **sp. nov.** was recovered as sister to (*C. autumnalis* **sp. nov.** + (*C. platensis* + *C. sesamum* **sp. nov.**). Only one homoplastic character supported the sister relationship between *C. platensis* + *C. sesamum* **sp. nov.**: valvula II of ovipositor bearing a gap between primary teeth (49-1) (Fig. 44L).

Ciminius is collected in open areas composed of grasslands with a predominance of native grasses (Poaceae) (Fig. 52). However, this genus is very abundant in environments with a strong degree of anthropomorphism, like gardens and pastures with predominance of exotic grasses, surviving besides many ambiental modifications, alongside with other grass-feeding Cicadellini genera like *Syncharina* and *Plesiommata*. The two studied specimens of *Arcanus* **gen. nov.** were collected in the gardens around Centro Politécnico, in Curitiba city, during specific collections aimed at obtaining *Ciminius* specimens. Despite many collections were made in this area and surrounding

areas of the city, only in 2022 specimens of the new genus were discovered, indicating that this is a difficult species to find, different from the grass-feeding genera as *Ciminius*, *Syncharina*, and *Plesiommata* which are very abundant. This "rarity" may indicate that, despite having been collected in the same environment, the new genus may not be associated with grasses, and may be associated with some herbaceous plant. More collection efforts will be needed to find more specimens, especially the female that remains unknown, and identify the host plant.

Within the family Cicadellidae, some aspects of sexual dimorphism are known, as size and brachyptery, the latter mostly associated with females, as reported herein. The sexual dimorphisms involving coloration are mostly known for Typhlocybinae and Eurymelinae subfamilies (Hamilton 1997). For the Cicadellini tribe, there are no reports for sexual color dimorphism in literature. This aspect is documented for the Proconiini tribe, occurring for the genera *Deselvana* Young, *Raphirrinus* Laporte (Ceotto and Mejdalani 2005) and *Propetes* Walker (Prando et al. 2017). In *Ciminius*, sexual color dimorphism is predominant for most species. The exceptions are *C. platensis*, a species that we were able to study a large amount of specimens, and *C. sidanus*, which the coloration is remarkably unique amongst the genus representatives. For two species, *C. callosa*, which the male is unknown, and *C. autumnalis* **sp. nov.**, the few numbers of representatives known at the present moment is insufficient to determine if color dimorphism occurs.

Ciminius callosa is a problematic species because the original description consists in coloration, external morphology and only external genitalia of male and female, with uninformative illustrations: the head, pronotum and mesonotum in dorsal view and the genital capsules in ventral views. This species was described based on two females, holotype (Fig. 4) and paratype, from Bolivia and a male allotype from Bahia, Brazil. *Ciminius callosa* presents coloration that resembles females of *C. albolineatus*, *C. platensis*, and *C. yana* in addition to similar distribution. Based on our results, we conclude that the association of a male from Bahia to the females from Bolivia, from an extremely distant locality, judged only by external features, could be misled due to the strongly homogeneous aspects between the *Ciminius* species, aggravated by the frequent presence of species with sexual color dimorphism. Therefore, we do not recognize the male specimen from Bahia as belonging to *C. callosa*. In addition, regard to the distribution, the female holotype was collected in Puerto Suárez, a city located near the boundaries of Mato Grosso do Sul State. According to the distribution known (Fig. 48), most of the specimens recorded from Mato Grosso do Sul belong to *C. platensis*. However, *C. albolineatus* is also registered to Bolivia and the of holotype *C. yana* was described from Porto Murtinho, a city of Mato Grosso do Sul, that makes a frontier with Bolivia, not far from the type locality of *C. callosa* (~300 km). Regarding the coloration, *Ciminius callosa* shares the same coloration pattern with females of *C. albolineatus*, *C. platensis*, and *C. yana*. Furthermore, Young (1977) also reported the similarity between *C. callosa* and *C. platensis*. We were not able to identify specimens of *C. callosa* following the original description, either in coloration or female sternite VII. Unfortunately, due to the similar distribution, and their very similar external morphology, we also are not able to propose a synonym between *C. callosa* and *C. albolineatus*, *C. platensis*, or *C. yana* at this time. We suggest that *Ciminius* collections are needed specifically at the type locality Puerto Suárez to study the genitalia of males and females and try to definitively solve this issue.

Although *Ciminius* species can be readily differentiated through morphology, a future study based on molecular data may contribute new discoveries, especially about the inner relationships that were recovered here with low support. Due to the wide distribution of the genus, further studies using biogeographic methods should be made to understand the *Ciminius* origin, whether it is Nearctic or Neotropical.

5. Declarations

Fundings: This work was supported by Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) fellowships from the senior author (Processes 131208/2021-7 and 141245/2023-9). ACD is post-doctoral fellowship from Fundação Carlos Chagas Filho de Amparo à Pesquisa do Rio de Janeiro (FAPERJ, Proc. E-26/204.206/2021).

Author Contributions: Conceptualization: LA and RRC. Methodology: LA, ACD and RRC. Software: LA and ACD. Validation: LA, ACD and RRC. Formal analysis: LA and ACD. Investigation: LA and RRC. Resources: RRC. Data Curation: LA. Writing – Original draft: LA. Writing – Review and Editing: ACD and RRC. Visualization: LA. Supervision: ACD and RRC. Project administration: LA, ACD and RRC. Funding Acquisition: LA and RRC.

6. Competing interests

The authors have declared that no competing interests exist.

7. Acknowledgements

We are very thankful to Vanessa Verdecia (CMNH) that kindly provided us the image of *Ciminius callosa* type, and to James Zahnizer that not only provided us the types images of *C. hartii*, *C. sidanus* and *C. taosus*, but kindly loaned us representants of these species. We also thank Andressa Paladini (UFPR), Beatiz Camisão (UFRJ), and Jádila S. Prando (UFRJ) who reviewed the first version of this manuscript, suggesting improvements.

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Supplementary Material 1

Table S1

Authors: Uluar O, Alasmar L, Domahovski AC Cavichioli RR (2025)
Data type: .xlsx
Explanation notes: Data matrix for phylogenetic analysis.

Link: https://doi.org/10.3897/asp.83.e143754.suppl1