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## Monograph

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# Eight new species of *Costanana* DeLong & Freytag (Hemiptera: Cicadellidae: Gyponini): taxonomic changes, key to males, and description of *Metacostana* gen. nov.

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**Abstract.** *Costanana* DeLong & Freytag, 1972 is a Neotropical genus of leafhoppers currently comprising 13 species with a wide distribution from Mexico to Argentina. In this study, eight new species of *Costanana* are described, *C. xenomorpha* sp. nov. from Department of Cuzco, Peru, and seven Brazilian species: *C. alata* sp. nov. from Minas Gerais State; *C. bifida* sp. nov. from Paraná and Mato Grosso states; *C. cifi* sp. nov., *C. obtusa* sp. nov. and *C. piraquarensis* from Paraná State; *C. luzi* sp. nov. from Distrito Federal; and *C. rubromarginata* sp. nov. from Mato Grosso and Pará states. We propose that *Costanana cella* DeLong & Freytag, 1972 is a junior synonym of *C. praecellens* (Stål, 1862) and *C. asymmetrica* DeLong & Freytag, 1972 is a junior synonym of *Gypona viridans* DeLong & Martinson, 1972. *Costanana costata* DeLong & Freytag, 1972 and *C. flavicosta* (Stål, 1862) are transferred to *Gypona* Germar, 1821, *C. minuta* (Spångberg, 1878) is transferred to *Acuponana* DeLong & Freytag, 1970 and *Gypona nupera* Van Duzee, 1907 is transferred to *Costanana*. *Gypona costata* comb. nov. and *Costanana santana* DeLong & Wolda, 1983 are newly recorded from Pernambuco State, and *Gypona flavicosta* comb. nov. is recorded from Espírito Santo and Paraná states, Brazil. The female genitalia of *Costanana flavina* DeLong & Freytag, 1972, *C. praecellens* and *Gypona flavicosta* comb. nov. are described and illustrated for the first time and a brief note on feeding behavior is given for *C. flavina* and *C. praecellens*. A key to males and a new diagnosis are provided for *Costanana*. We also describe and illustrate *Metacostana cornuta* gen. et sp. nov., a new Brazilian genus for Gyponini sharing characteristics with *Costanana*, *Actuthana* Domahovski & Cavichioli, 2018, *Domahovana* Silva *et al.*, 2022 and *Dumorpha* DeLong & Freytag, 1975.

**Keywords.** Auchenorrhyncha, Brazil, Iassinae, leafhoppers, taxonomy.

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## Introduction

Gyponini Stål, 1870, the most diverse of the twelve tribes of Iassinae Walker, 1870, currently comprise about 1465 species in 79 genera, but with an expectation of easily surpassing 2000 species (Gonçalves *et al.* 2021; Silva *et al.* 2022; Domahovski & Cavichioli 2022a, 2022b, 2022c, 2023; Laranjeira *et al.* 2022). This tribe is restricted to the New World, with a distribution of approximately 18%, 19.3% and 63.6% of the species in North, Central and South America, respectively, and 20, 30 and 73 genera recorded for each Continent, respectively. Gyponini includes medium-sized to large leafhoppers, often green, yellow or brown and frequently with black markings; head frequently produced anterad, with crown well delimited; ocelli positioned on crown, distant from margins; forewing with appendix generally well developed, but not extended around the apex; hind wing with veins  $R_{4+5}$  and  $M_{1+2}$  free distally; males with subgenital plates generally not completely concealed by pregenital sternite; and female with first valvula of the ovipositor with dorsal sculpturing generally strigate (Krishnankutty *et al.* 2016). In Brazil, 48 genera and 386 species are recorded, of which seven species of *Costanana* are recorded for only three states: Santa Catarina, Rio de Janeiro and Pará (Takiya *et al.* 2023).

The genus *Costanana* was erected by DeLong & Freytag (1972a) to include the type species *Costanana dunda* DeLong & Freytag, 1972, being characterized as follows: “Head broadly roundly produced, crown more than twice as broad between eyes at base as median length, with deep transverse striae angled with front, margin thin, not foliaceous. Ocelli more than twice as distant from each other as either is from proximal eye. In color the species of this genus are brown, usually dark brown with a round black spot on pronotum one behind each eye at half the length of pronotum. Forewings uniform brown except costal margin which is broadly yellow on basal half or two-thirds, occasionally interrupted at middle”. In the same year, DeLong & Freytag (1972b) transferred *Gypona flavicosta* Stål, 1862, *G. minuta* Spångberg, 1878, *G. nana* Fowler, 1903 and *G. praecellens* Stål, 1862 to *Costanana* and described five new species. DeLong & Wolda (1983) described the last three species of the genus.

In this paper, eight new species of *Costanana* are described, two new synonyms and four new combinations are proposed, a key to males of *Costanana* is provided, a new diagnosis is given including new characters, and new records for Brazilian states are reported. In addition, a new genus for Gyponini, similar to *Acuthana* Domahovski & Cavichioli, 2018, *Costanana*, *Domahovana* Silva *et al.*, 2022 and *Dumorpha* DeLong & Freytag, 1975, is described.

## Material and methods

Specimens studied herein are deposited in the following collections:

- CAS = California Academy of Sciences, San Francisco, USA
- CMNH = Carnegie Museum of Natural History, Pittsburgh, USA
- CZJA = Coleção Zoológica Didático-Científica Dr. Joachim Adis, Belém, Pará, Brazil
- DZRJ = Coleção Entomológica Prof. José Alfredo Pinheiro Dutra, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil
- DZUP = Coleção Entomológica Pe. Jesus Santiago Moure, Universidade Federal do Paraná, Curitiba, Brazil
- MNRJ = Departamento de Entomologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil
- MUSM = Museo de Historia Natural de la Universidad Mayor de San Marcos, Lima, Peru
- MZSP = Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil
- NCSU = North Carolina State University Collection, Department of Entomology, Raleigh, USA
- NHMW = Naturhistorisches Museum Wien, Vienna, Austria
- NHRS = Swedish Museum of Natural History, Stockholm, Sweden
- USNM = United States National Museum, Washington, D.C., USA

The terminology used in the descriptions mainly follows Young (1968, 1977), except for features of the head (Hamilton 1981; Mejdalani 1998), wings (Dietrich 2005), and legs (Rakitov 1997). Techniques for the dissection of male and female genitalia follow Oman (1949), with modifications proposed by Cavichioli & Takiya (2012). The term gonoplac is used according to Mejdalani (1998). Digital habitus images were obtained with a Leica MZ12.5 stereo microscope with an attached SCMOS 14000KPA digital camera. Photos were stacked using the CombineZ5 software. Illustrations of the male genitalia were drawn with Adobe Illustrator CS6 software. The gonoplac and first and second valvulae were separated and mounted on a temporary slide, to be photographed with a Nikon optical microscope attached to a digital camera (SCMOS 05100KPB).

Verbatim label data are transcribed between quotation marks, with a backslash (\) indicating line breaks. Abbreviations used in the descriptions of legs are as follows: AD = anterodorsal; AM = anteromedian; AV = anteroventral; IC = intercalary; PD = posterodorsal; PV = posteroventral.

## Results

Class Insecta Linnaeus, 1758  
Order Hemiptera Linnaeus, 1758  
Suborder Auchenorrhyncha Duméril, 1806  
Family Cicadellidae Latreille, 1825  
Subfamily Iassinae Walker, 1870  
Tribe Gyponini Stål, 1870

Genus *Costanana* DeLong & Freytag, 1972

### Type species

*Costanana dunda* DeLong & Freytag, 1972a: 229.

### Diagnosis

Small to medium-sized leafhoppers (Figs 11–13) 5.0 to 9.1 mm in length. Head (Figs 1A, 7A, 25A), in dorsal view, usually slightly produced anteriorly, median length of crown slightly less than or as long as half interocular width; crown surface transversely striated; in lateral view (Figs 2C, 6C), crown-face transition distinct, thin or moderately thick, and transversely carinated. Forewing (Figs 11–13) costal margin with yellow (sometimes green in life) macula on basal third and with depigmented (white) macula on apical third (absent in a few species); appendix well developed. Male sternite VIII (Fig. 1E) long, usually triangular, fully hiding subgenital plates. Male pygofer (Fig. 1G) commonly without process. Subgenital plate (Fig. 1H) frequently tapered to weakly sclerotized apex and bearing long filiform setae. Aedeagus (Fig. 1L) without apodemal processes. Female with first and second valvulae of ovipositor (Fig. 3D, F) narrow, not broadened medially. Second valvula (Fig. 3F) with dorsal protuberance reduced; dorsal margin (Fig. 3G) with small denticles restricted to apical portion.

COLORATION. Dorsum usually dark brown (Figs 11A, E, 12A, C, E, G, 13A, E) or less frequently reddish-brown (Figs 11G, 13C) or yellowish-brown (Fig. 11C), contrasting with venter light yellow (Fig. 11B). Head and pronotum (Fig. 11A, C) frequently with small black maculae. Proepimeron (Fig. 1C) light yellow without maculae. Forewing costal margin with broad (Fig. 11C) or narrow (Fig. 11A, E, G) yellow (sometimes green in life) macula on basal third and with large (Fig. 12A, C) or small (Fig. 11A, E) depigmented (white) macula on apical third, which in a few species is absent (Figs 11G, 13C). Legs (Fig. 11B, D, F, H) yellow.

**STRUCTURE.** Head in dorsal view (Fig. 1A): usually slightly produced anteriorly, median length of crown slightly less than half interocular width; crown surface with fine parallel transverse striations (Fig. 25A); anterior margin broadly rounded and usually parallel to anterior margin of pronotum; transocular width of head narrower than humeral width of pronotum; ocelli closer to anterior than posterior margin of crown and equidistant between median line and eyes, or rarely closer to midline; in frontal view (Fig. 2B), frons longer than wide, flat, not excavated below anterior margin of crown and without striations, texture shagreen; frontogenal suture distant from eye margins by half width of clypeus, not surpassing antennal ledge; antennal ledge carinated, obliquely downwards in relation to frons and extending over frons by short distance; gena with ventrolateral margins slightly convex at midlength and weakly excavated near eye; maxillary plate produced ventrally as far as clypeus apex; epistomal suture indistinct medially; clypeus not inflated, ca 1.5× as long as wide, lateral margins approximately parallel, apex emarginated; in lateral view (Figs 2C, 6C), crown-face transition thin or moderately thick and transversely carinated. Pronotum in dorsal view (Fig. 1A): transverse striated except near anterior margin; lateral margins convergent anterad; in lateral view (Fig. 1C), moderately declivous; head and pronotum in continuous slope. Scutellum (Fig. 1C) not inflated. Forewing (Fig. 1A) without extra crossveins; venation distinct; inner discal cell frequently very short (Figs 1D, 6D, 9D) or open, m-cu<sub>2</sub> crossvein absent (Figs 2D, 7D, 8D); five apical cells (R1 vein present); appendix well developed, wider than maximum width of inner apical cell, and involving first and second apical cells. Profemur AD, AM, and PD rows reduced and poorly defined, with exception of apical setae AD<sub>1</sub>, AM<sub>1</sub> and PD<sub>1</sub>, respectively. Protibia more or less cylindrical, with a longitudinal carina adjacent to PD row; AV row formed by long setae, gradually increasing in thickness and length towards apex; AD formed by many small undifferentiated setae. Hind leg femoral setal formula 2:2:1. Metatibia AD row without intercalary setae between macrosetae; PV row with setae of apical half formed by sequence of 1 thicker and 3–4 thinner setae, ending with a long and thick seta. Metatarsomere I with inner row of plantar surface developed, but formed by small (not cuculate) setae, median row absent or with minute setae; apex with platellae flanked by 2 tapered lateral setae on inner and 1 on external corner. Metatarsomere II with platellae flanked by 2 tapered lateral setae on inner and 1 on external corner.

**MALE TERMINALIA.** Male sternite VIII (Fig. 1E) long, fully hiding subgenital plates in repose, frequently triangular. Male pygofer (Fig. 1G) commonly without apical process (present in *C. dunda* and *C. xenomorpha* sp. nov.). Subgenital plate (Fig. 1H) frequently tapered to apex, weakly sclerotized distally and bearing long filiform setae. Aedeagus (Fig. 4L) without apodemal processes.

**FEMALE TERMINALIA.** First and second valvulae of ovipositor (Fig. 3D, F) not broadened medially. First valvula (Fig. 3D) with ventral interlocking device long, extending on basal two-thirds or more. Second valvula (Fig. 3F) with dorsal protuberance reduced; dorsal margin (Fig. 3G) with small denticles restricted to apical portion.

### **Distribution**

North America (México), Central America (Jamaica and Panama) and South America (Argentina, Brazil, Colombia and Peru).

### **Remarks**

*Costanana* is one of the genera of Gyponini having the crown surface transversely striated, the crown-face transition defined, the male sternite VIII well produced posterad, hiding the subgenital plates in repose, and the aedeagus without apodemal processes, as in *Acuthana*, *Domahovana*, and *Metacostana* gen. nov. Among these genera, the coloration of the dorsum being brownish with forewings having yellow or depigmented (white) maculae along the costal margin easily separate *Costanana* from all the genera except for *Metacostana*. In this case, *Costanana* can be differentiated by the metatibia AD row being without intercalary setae between the macrosetae, the pygofer without apical processes, the

aedeagus without apodemal processes, and the different shape of the female ovipositor. Species of *Polana* (*Angusana*) DeLong & Freytag, 1972 are similar in coloration to those of *Costanana*, but can be differentiated by the crown-face transition being rounded in profile, the aedeagus with apodemal processes, and the female second valvulae with the apical portion triangular in cross-section.

### Species of *Costanana*

- C. alata* sp. nov. Brazil (Minas Gerais).  
*C. apicata* DeLong & Wolda, 1983: 467. Panama.  
*C. bifida* sp. nov. Brazil (Paraná).  
*C. cifi* sp. nov. Brazil (Paraná).  
*C. circumaga* DeLong & Wolda, 1983: 466. Panama.  
*C. dunda* DeLong & Freytag, 1972a: 229. Mexico.  
*C. flavina* DeLong & Freytag, 1972b: 496. Argentina; Brazil (Santa Catarina, Paraná [new record], Rio Grande do Sul [new record]); Colombia?; Panama?  
*C. helvacosta* DeLong & Freytag, 1972b: 496. Colombia.  
*C. luzi* sp. nov. Brazil (Distrito Federal).  
*C. nana* (Fowler, 1903): 315 (*Gypona*). Mexico.  
*C. nupera* (Van Duzee, 1907): 61 comb. nov. (*Gypona*). Jamaica.  
*C. obtusa* sp. nov. Brazil (Bahia, Paraná).  
*C. piraquarensis* sp. nov. Brazil (Paraná).  
*C. praecellens* (Stål, 1862): 47 (*Gypona*). Brazil (Paraná [new record], Rio de Janeiro, Santa Catarina).  
*C. rubromarginata* sp. nov. Brazil (Mato Grosso).  
*C. santana* DeLong & Wolda, 1983: 466. Brazil (Pará, Pernambuco [new record]).  
*C. xenomorpha* sp. nov. Peru.

#### *Costanana alata* sp. nov.

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Figs 1, 11A–B

### Diagnosis

Coloration (Fig. 11A) of head and pronotum brown with small black maculae, forewing costal margin with narrow light yellow macula on anterior third and small depigmented (white) macula on apical third. Style (Fig. 1K) with dentiform ventral process near base of blade; apex truncated, forming pair of acute processes directed dorsally and ventrally. Aedeagus (Fig. 1L–M) with pair of ventral wing-shaped processes near base; shaft with slender basodorsal process and pair of minute spurs on ventral margin.

### Etymology

The species epithet ‘*alata*’ refers to the aedeagus with processes resembling wings.

### Material examined

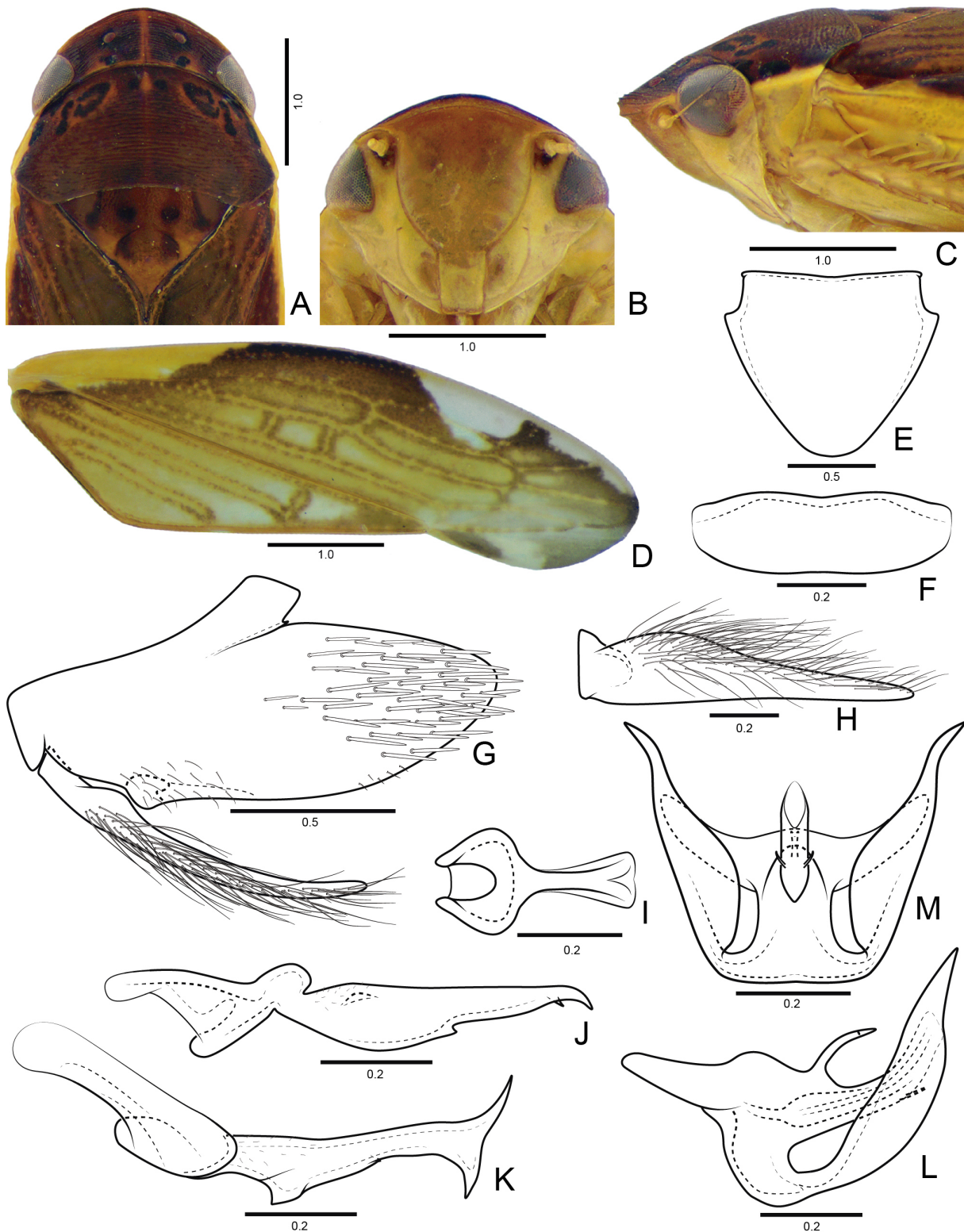
#### Holotype

BRAZIL • ♂, “Brasil, Minas Gerais, \ Extrema, Morro do Lopo, \ 22.881°S 46.308°W, \ 1520m, 9.xii.2012, G. Melo \ & P. Grossi, arm.[armadilha] Luminosa”; DZUP 215484.

### Description

#### Male

MEASUREMENTS. Holotype male: total length 6.8 mm.



**Fig. 1.** *Costanana alata* sp. nov., holotype, ♂ (DZUP215484). **A.** Head and thorax, dorsal view. **B.** Head, ventral view. **C.** Head and thorax, lateral view. **D.** Forewing. **E–M.** Male terminalia. **E.** Sternite VIII, ventral view. **F.** Valve, anterior view. **G.** Pygofer, valve and subgenital plate, lateral view. **H.** Subgenital plate, ventral view. **I.** Connective, dorsal view. **J.** Style, dorsal view. **K.** Style, lateral view. **L.** Aedeagus, lateral view. **M.** Aedeagus, posterior view. Scale bars in mm.

**COLORATION.** Dorsal portion of head and thorax reddish-brown (Figs 1A, C, 11A); ventral portion yellow (Figs 1B–C, 11B). Crown (Fig. 1A) with black maculae surrounding ocelli; pair of rounded black spots behind ocelli, near posterior margin; median line and posterior margin light brown; eyes (in life) and ocelli red. Pronotum (Fig. 1A) with black irregular maculae and light brown spots near anterior and lateral margins; lateral margin yellow. Mesonotum with pair of dark brown maculae near lateral angles and medially; scutellum yellowish, with brown areas adjacent to scutoscuteellar suture. Face (Fig. 1B) with frons slightly brownish dorsally. Forewing (Fig. 1D) with narrow light yellow macula on anterior third of costal margin and a depigmented (white) macula on costal margin at level of outer anteapical cell, and apex of third and fourth apical cells; veins outlined by dark brown. Legs (Fig. 11B) yellow, apex of metatibia dark brown.

**STRUCTURE.** Head in dorsal view (Fig. 1A): median length of crown as long as half interocular width; transocular width of head eight tenths humeral width of pronotum; in lateral view (Fig. 1C), with anterior margin moderately thick, with 5–6 well developed carinae. Forewing (Fig. 1D) with inner discal cell very short, one-third as long as the outer discal cell; apex slightly tapered. Profemur AV row with 3–4 setae restricted to basal half and PV row with 2 setae restricted to distal half. Protibia PD row with 3 long setae and apical PD<sub>1</sub> seta developed; PV row developed, with 8 setae increasing in thickness and length towards apex. Metatibia rows PD, AD, and AV with 21, 12, and 12 macrosetae, respectively. Metatarsomere I apex with 3 platellae. Metatarsomere II apex with 2 apical platellae. Other characteristics as in the generic description.

**MALE TERMINALIA.** Sternite VIII (Fig. 1E) 1.2× as wide as long; lateral margins excavated at base, forming a triangular projection and then converging towards apex, narrow and rounded. Valve (Fig. 1F) 3.1× as wide as long; posterior margin almost straight. Pygofer (Fig. 1G), in lateral view, 2.3× as long as maximum height; ventral margin with a small protrusion near base; posterodorsal and ventral margins rounded; external surface near ventral margin with short filiform setae; macrosetae distributed on apical half; apex slightly tapered and rounded. Subgenital plate (Fig. 1G), in lateral view, short, surpassing half length of pygofer; in ventral view (Fig. 1H), 5× as long as wide; inner margin straight; external margin rounded on basal third; ventral surface and external margin with long filiform setae; apex strongly tapered and weakly sclerotized. Connective (Fig. 1I) Y-shaped; arms weakly produced laterally; stalk about as long as maximum width of arms; median keel weakly developed. Style (Fig. 1J), in dorsal view, with outer lobe small and rounded; inner margin with a small dentiform process near midlength of blade; in lateral view (Fig. 1K), ventral margin not serrated, with dentiform process near base of blade; apex truncated, forming a pair of acute processes directed dorsally and ventrally. Aedeagus (Fig. 1L–M) preatrium not developed; dorsal apodeme strongly elongated laterally; shaft short, nearly tubular, with pair of ventral wing-shaped processes near base, curved dorsally with divergent and acute apices; dorsal margin of shaft with slender basodorsal process; ventral margin with pair of minute spurs subapically.

#### **Female**

Unknown.

#### **Remarks**

*Costanana alata* sp. nov. is most similar to *C. flavina* in having the same color pattern (Figs 11A–B, 13A–B) and the aedeagal shaft short with a pair of ventral processes near the base, not contiguous to shaft and following its curvature. The new species can easily be separated from *C. flavina* by having the apex of the style truncated (Fig. 1K) and the longer and winged ventral processes of the aedeagal shaft (Fig. 1L–M).

*Costanana bifida* sp. nov.

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Figs 2–3, 11C–D

**Diagnosis**

Coloration (Fig. 11C) of head and pronotum yellowish-brown with small black maculae, forewing costal margin with broad light yellow macula on anterior third and large depigmented (white) macula on apical third. Style (Fig. 2K) without dentiform ventral process near base of blade; apical portion bifid, with slender process at apical third, directed posterad and adjacent to dorsal apex. Aedeagus (Fig. 2L–M) with pair of lateral processes at base, strongly curved dorsally; shaft short, strongly compressed laterally, without apical processes.

**Etymology**

The species epithet ‘*bifida*’ refers to the branched blade of the style.

**Material examined**

**Holotype**

BRAZIL • ♂; “Terra Boa PR [Paraná] \ 15-25.VII.1985 \ J.A. Rafael”; DZUP 215493.

**Paratypes**

BRAZIL – Paraná • 1 ♂; “Brasil, PR [Paraná], Antonina \ Res. [Reserva] Rio Cachoeira \ 25.316°S 46.696°W \ 50m, 05-10.XI.2015 \ Luminosa suspensa \ Entomologia UFPR”; DZUP 215494 • 1 ♀; “Brasil, PR [Paraná], Antonina, \ R.P.P.N. [Reserva Particular do Patrimônio Natural] Guaricica, \ 25.316°S 46.696°W \ 31.I-04.II.2022, Luz solo, \ Entomologia UFPR”; DZUP 215495 • 1 ♀; same collection data as for preceding, except 23–27 Jan. 2023; DZUP 214305 • 1 ♀; “Jundiaí do Sul - PR [Paraná], Fazenda Monte Verde \ Brasil 19.X.1987 \ Lev. [Levantamento] Ent. [Entomológico] PROFAUPAR \ Malaise”; DZUP 215496.

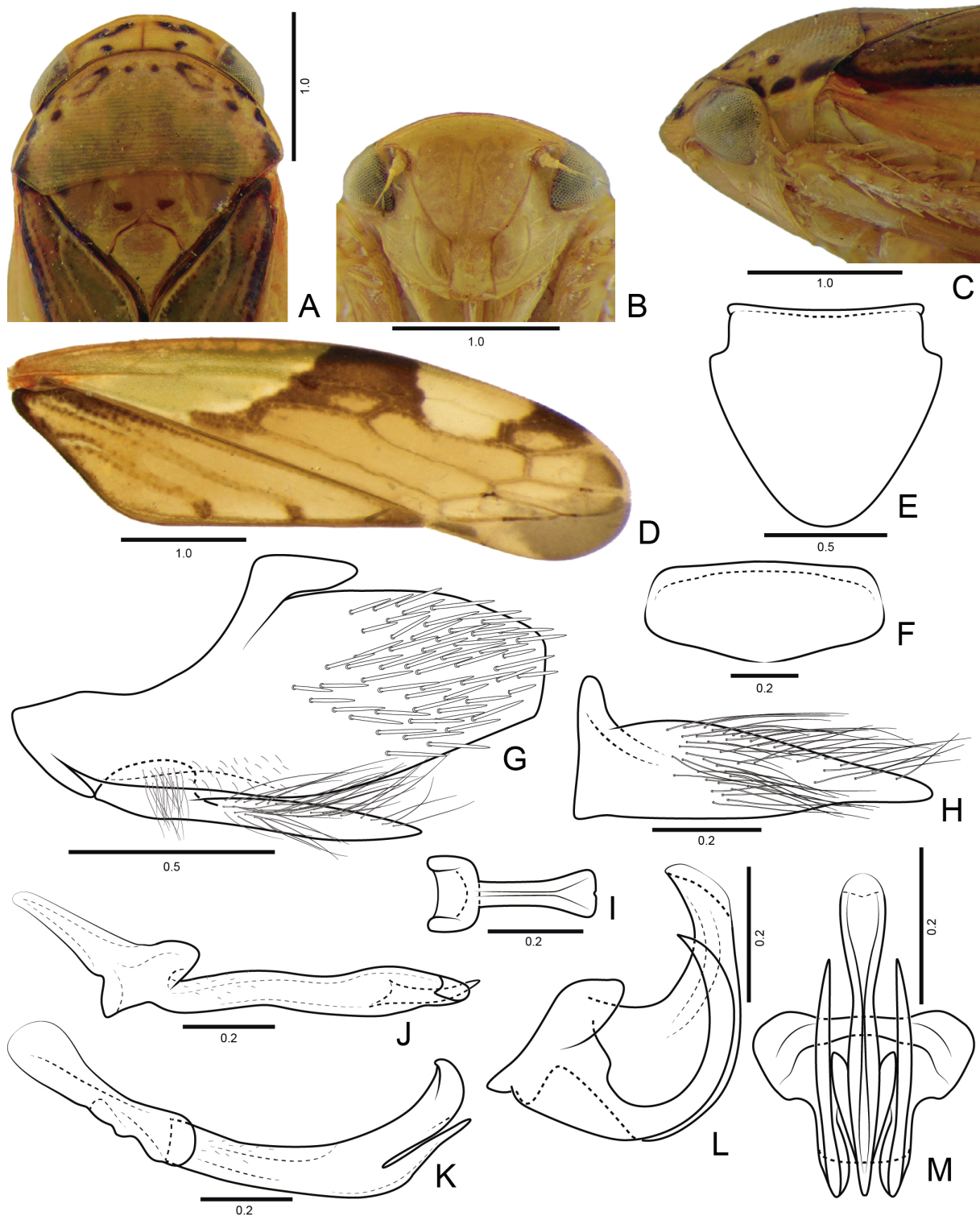
**Description**

MEASUREMENTS. Holotype male: total length 5.9 mm. Paratype male (n = 1) 5.7 mm; female (n = 3) 5.8–6.1 mm.

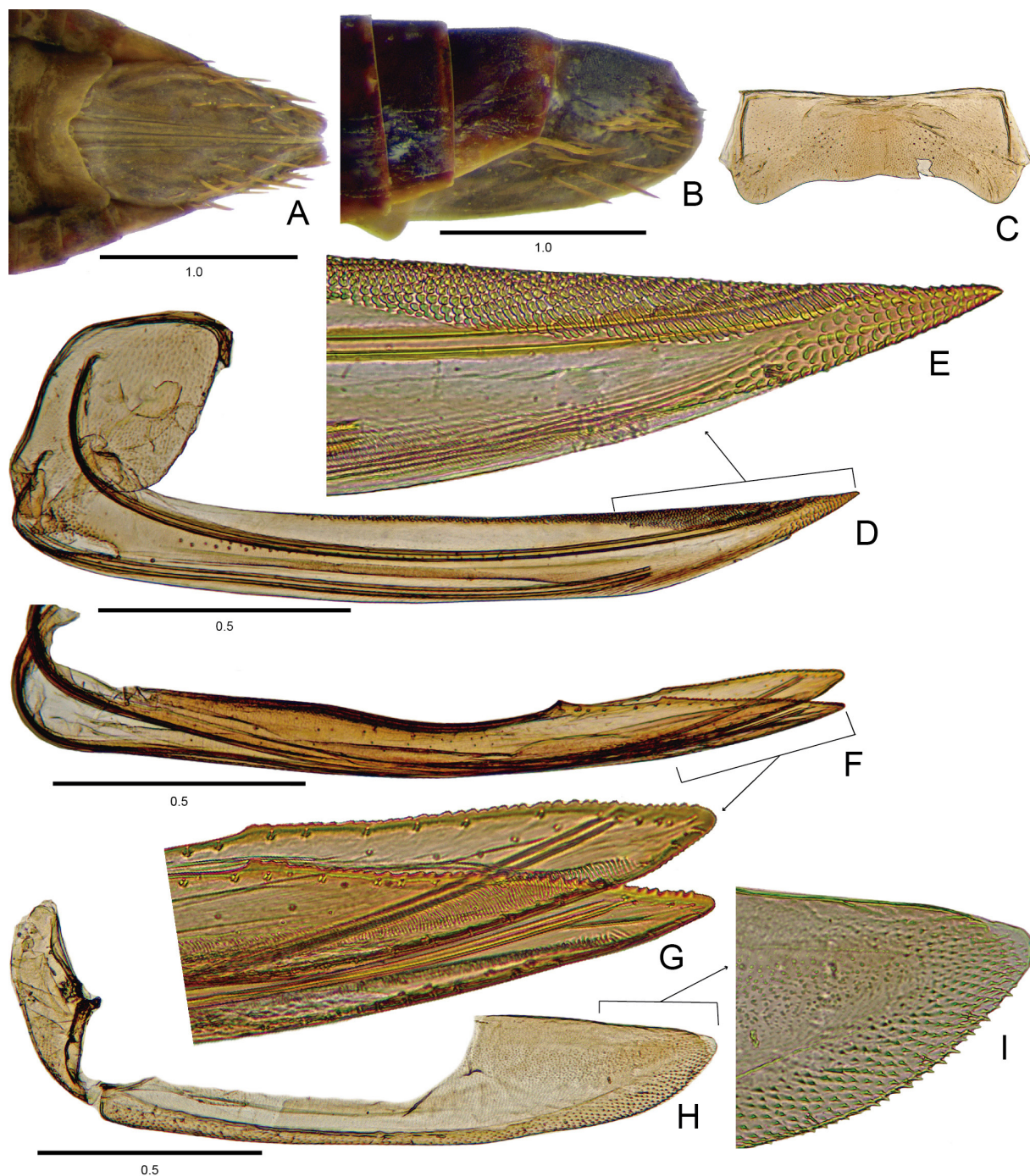
COLORATION. Dorsal portion of head and thorax yellowish-brown (Figs 2A, C, 11C); ventral portion yellow (Figs 2B–C, 11D). Crown (Fig. 2A) with transverse narrow black stripe interrupted medially over median line; pair of rounded black spots behind ocelli, near posterior margin; eyes (in life) and ocelli red. Pronotum (Fig. 2A) with small black irregular maculae near anterior and lateral margins. Mesonotum (Fig. 2A) with pair of rounded black spots medially and pair of elongated black macula submedially (paratypes). Face (Fig. 2B) without maculae. Forewing (Fig. 2D) with large light yellow macula on anterior half of costal margin and a large rounded depigmented (white) macula at level of outer anteapical cell, remaining portion of costal cell, apex of apical cells, apex of clavus, apex of anal veins and appendix dark brown. Legs (Fig. 11D) yellow, without black markings.

STRUCTURE. Head in dorsal view (Fig. 2A): median length of crown slightly shorter than interocular width; transocular width of head 8.5 tenths humeral width of pronotum; in lateral view (Fig. 2C), with anterior margin thick, with 6–7 carinae. Forewing (Fig. 2D) inner discal cell open, m-cu<sub>2</sub> crossvein absent; apex rounded. Profemur AV row with 3–4 setae restricted to basal half and PV row with 1 apical seta. Protibia PD row with 3 long setae and apical PD<sub>1</sub> seta developed; PV row developed, with 8 setae increasing in thickness and length towards apex. Metatibia rows PD, AD, and AV with 20–21, 12, and 12–13 macrosetae, respectively. Metatarsomere I apex with 3 platellae. Metatarsomere II apex with 2 platellae. Other characteristics as in the generic description.





**Fig. 2.** *Costanana bifida* sp. nov., holotype, ♂ (DZUP 215493). **A.** Head and thorax, dorsal view. **B.** Head, ventral view. **C.** Head and thorax, lateral view. **D.** Forewing. **E–M.** Male terminalia. **E.** Sternite VIII, ventral view. **F.** Valve, anterior view. **G.** Pygofer, valve and subgenital plate, lateral view. **H.** Subgenital plate, ventral view. **I.** connective, dorsal view. **J.** Style, dorsal view. **K.** Style, lateral view. **L.** Aedeagus, lateral view. **M.** Aedeagus, posterior view. Scale bars in mm.



**Fig. 3.** *Costanana bifida* sp. nov., paratype, ♀ (DZUP 215495). **A.** Apical portion of abdomen, ventral view. **B.** Apical 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 valvulae, lateral view. **G.** Apical portion of second valvulae. **H.** Second valvifer and gonoplac, lateral view. **I.** Apical portion of gonoplac. Scale bars in mm.

**MALE TERMINALIA.** Sternite VIII (Fig. 2E) 1.1× as wide as long; lateral margins excavated at base, forming a triangular projection and then converging towards apex, narrow and rounded. Valve (Fig. 2F) 2.5× as wide as long; posterior margin slightly rounded. Pygofer (Fig. 2G), in lateral view, 2.2× as long as maximum height; ventral margin straight; posterodorsal margin slightly rounded; posteroventral margin straight; external surface near ventral margin with short filiform setae; macrosetae distributed on apical half; apex truncated. Subgenital plate (Fig. 2G), in lateral view, short, surpassing half length of pygofer; in ventral view (Fig. 2H), 3.7× as long as wide; inner margin approximately straight; external margin rounded on basal half; ventral surface and external margin with long filiform setae; apex strongly tapered and weakly sclerotized. Connective (Fig. 2I) Y-shaped; arms weakly produced laterally; stalk about twice as long as maximum width of arms; median keel weakly developed. Style (Fig. 2J), in dorsal view, with outer lobe small and rounded; in lateral view (Fig. 2K), blade evenly curved dorsally; ventral margin not serrated, with a slender process at apical third, directed posterad and adjacent to dorsal apex; apex broad and rounded, forming small tip directed anterad. Aedeagus (Fig. 2L–M) preatrium not developed; dorsal apodeme produced laterally and broadly rounded; pair of lateral processes at base, strongly curved dorsally, wide at base and slender distally, apex acute; shaft short, wide, strongly compressed laterally; apical portion enlarged in posterior view and without processes.

**FEMALE TERMINALIA.** Sternite VII (Fig. 3A, C), in ventral view, 2.5× as wide as long; posterolateral angles rounded and produced posterad; posterior margin slightly excavated medially and each side of lateral angles. Internal sternite VIII membranous. Pygofer (Fig. 3A–B), in lateral view, approximately 2× as long as high; macrosetae distributed at ventral half and apex; apex rounded. First valvifer (Fig. 3D) subelliptic, slightly higher than wide. First valvula (Fig. 3D) 7.2× as long as high; ventral interlocking device long, reaching apical fourth; dorsal sculptured area areolate; apical portion (Fig. 5E) gradually tapering to apex; apex acute and areolate. Second valvula (Fig. 3F) 11.5× as long as high; dorsal protuberance small and acute, localized before midlength of blade; apical portion (Fig. 3G) with dorsal margin bearing small denticles approximately regular in shape and size; ventroapical margin with minute rounded denticles; apex subacute. Second valvifer (Fig. 3H) 2.2× as high as wide. Gonoplac (Fig. 3H) 5× as long as high; dorsoapical margin straight, approximately one-third of length of gonoplac; ventral margin evenly rounded, with a few short setae; outer surface (Fig. 3I) with many integumentary denticles; rounded apex.

### Remarks

*Costanana bifida* sp. nov. is similar to *C. helvacosta*, *C. nana*, *C. santana* and *C. rubromarginata* sp. nov. in having the aedeagus with a pair of processes arising near the base of the shaft and the apical portion of the shaft without processes (Fig. 2L–M). However, the new species is easily separated from these former species by having the apex of the style branched (Fig. K) and the aedeagus with the shaft short, wide and strongly compressed laterally (Fig. 2L–M). The crown-face transition being weakly defined (Fig. 2C) is similar to in species of *Polana* DeLong, 1942; however, the morphology of the female ovipositor (Fig. 3D, F) easily excludes the new species from *Polana*.

*Costanana cifi* sp. nov.

[urn:lsid:zoobank.org:act:8714AD76-D0F8-4A68-89CD-902504BBB98B](https://doi.org/10.3896/abris.2023.8714AD76-D0F8-4A68-89CD-902504BBB98B)

Figs 4–5, 11E–F

### Diagnosis

Coloration (Fig. 11E) of crown black, pronotum brown with inconspicuous black maculae, forewing costal margin with sequence of small yellow spots and a small depigmented (white) macula on apical third. Style (Fig. 4K) without dentiform ventral process near base of blade; apical third with short slender process overlapping dorsal apex. Aedeagus (Fig. 4L–M) without processes near base; shaft with short subapical spiniform process on dorsal margin and pair of long subapical processes almost as long as shaft length, directed dorsally and curved anterad.

### **Etymology**

The new species name is an anagram of the initials C.I.I.F. and refers to the Centro de Identificação de Insetos Fitófagos, Departamento de Zoologia of Universidade Federal do Paraná, that sampled many insects in Paraná State in the year 1985.

### **Material examined**

#### **Holotype**

BRAZIL • ♂; “S. [São] José dos Pinhais - PR [Paraná] \ Brasil (BR 277 Km 54) \ 23.III.1985 \ C.I.I.F. (Luminosa)”; DZUP 215484.

#### **Paratypes**

BRAZIL – Paraná • 1 ♀; “Morretes - PR [Paraná] Brasil \ (IAPAR) [Instituto Agronômico do Paraná] \ 31.III.1985 \ C.I.I.F. [Centro de Identificação de Insetos Fitófagos] (Luminosa)”; DZUP 215487 • 1 ♀; same collection data as for preceding, except “06.IV.1985”; DZUP 215488.

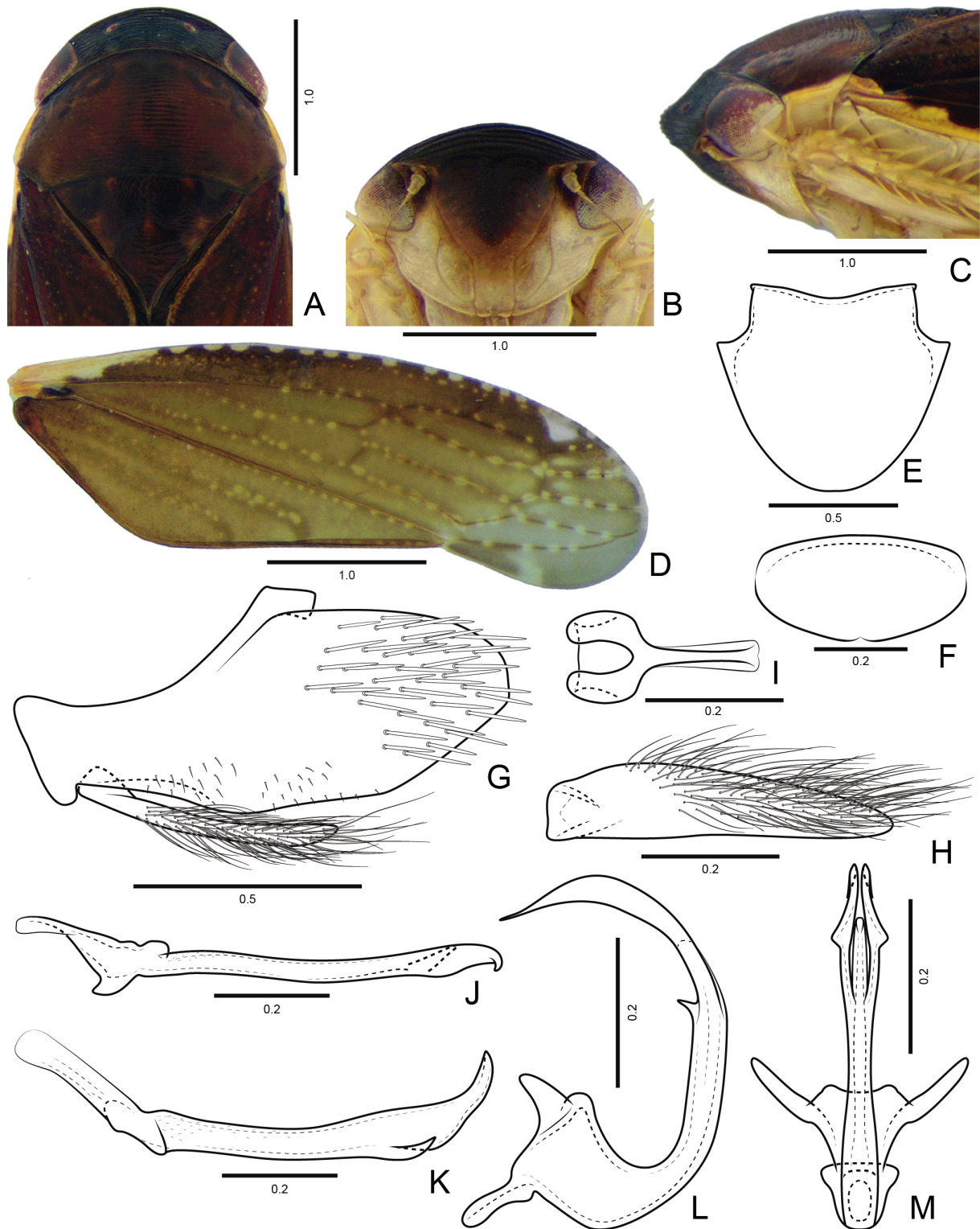
### **Description**

MEASUREMENTS. Holotype male: total length 5.2 mm. Paratype female (n = 2) 5.6–5.8 mm.

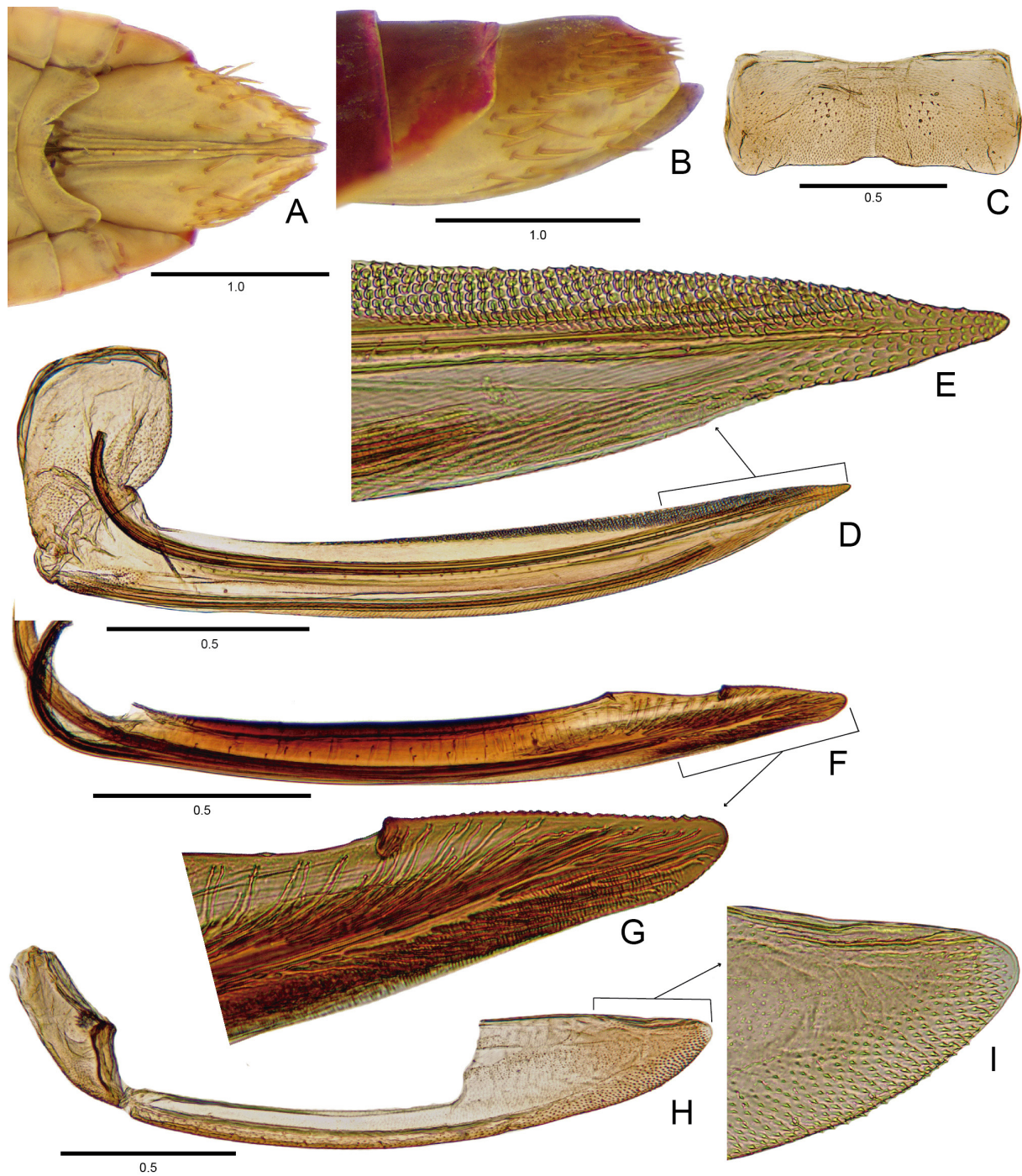
COLORATION. Dorsal portion of head and thorax reddish-brown (Figs 4A, C, 11E); ventral portion yellow (Figs 4B–C, 11F). Crown (Fig. 4A) black; eyes and ocelli red. Pronotum (Fig. 4A) with inconspicuous irregular black maculae near anterior margin; lateral margin yellow. Mesonotum with small yellowish spots near anterior margin and scutoscutellar suture. Face (Fig. 4B) with frons almost completely black, except with lateral and ventral margins brownish; gena black between eye and frons. Forewing (Fig. 4D) costal margin with small slender yellow macula on anterior fifth, sequence of 13–14 yellow spots and a small depigmented (white) macula at apex of outer apical cell; veins brown with several yellowish spots. Legs (Figs 4C, 11F) yellow, without black markings.

STRUCTURE. Head in dorsal view (Fig. 4A): median length slightly shorter than interocular width; transocular width of head 8.5 tenths humeral width of pronotum; in lateral view (Fig. 4C), with anterior margin thick, with 7–8 well developed carinae. Forewing (Fig. 4D) with inner discal cell not distinctly shorter than outer discal cell; apex rounded. Profemur AV row with 3–4 setae restricted to basal half and PV row with 1 apical seta. Protibia PD row with 3 long setae and apical PD<sub>1</sub> seta developed; PV row developed, with 6–7 setae increasing in thickness and length towards apex. Metatibia rows PD, AD, and AV with 18–19, 12, and 13–14 macrosetae, respectively. Metatarsomere I apex with 3–4 platellae. Metatarsomere II apex with 2 apical platellae. Other characteristics as in the generic description.

MALE TERMINALIA. Sternite VIII (Fig. 4E) 1.2× as wide as long; lateral margins excavated at base, forming a triangular projection; apex broadly rounded. Valve (Fig. 4F) 2× as wide as long; posterior margin rounded, slightly emarginated medially. Pygofer (Fig. 4G), in lateral view, 2.2× as long as maximum height; ventral margin slightly rounded; posterodorsal margin rounded; posteroventral margin straight; external surface near ventral margin with short filiform setae; macrosetae distributed on apical half; apex subtruncated. Subgenital plate (Fig. 4G), in lateral view, short, slightly surpassing half length of pygofer; in ventral view (Fig. 4H), 4.5× as long as wide; inner margin straight; external margin broadly rounded; ventral surface and external margin with long filiform setae; apex tapered and weakly sclerotized. Connective (Fig. 4I) Y-shaped; arms weakly produced laterally; stalk narrow, about as long as maximum width of arms; median keel weakly developed. Style (Fig. 4J), in dorsal view, with outer lobe reduced; in lateral view (Fig. 4K), blade strongly elongated, almost straight; ventral margin not serrated, with short slender process at apical third, directed posterad, weakly curved dorsally and overlapping dorsal apex; apex tapered and curved dorsally. Aedeagus (Fig. 4L–M) preatrium developed; dorsal apodeme strongly produced, with divergent arms; shaft elongated curved dorsally; dorsal margin with subapical spiniform



**Fig. 4.** *Costanana cifi* sp. nov., holotype, ♂ (DZUP 215484). A. Head and thorax, dorsal view. B. Head, ventral view. C. Head and thorax, lateral view. D. Forewing. E–M. Male terminalia. E. Sternite VIII, ventral view. F. Valve, anterior view. G. Pygofer, valve and subgenital plate, lateral view. H. Subgenital plate, ventral view. I. Connective, dorsal view. J. Style, dorsal view. K. Style, lateral view. L. Aedeagus, lateral view. M. Aedeagus, posterior view. Scale bars in mm.



**Fig. 5.** *Costanana cifi* sp. nov., paratype, ♀ (DZUP 215487). **A.** Apical portion of abdomen, ventral view. **B.** Apical 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 valvulae, lateral view. **G.** Apical portion of second valvulae. **H.** Second valvifer and gonoplac, lateral view. **I.** Apical portion of gonoplac. Scale bars in mm.

process; pair of long subapical processes almost as long as shaft length, directed dorsally and curved anterad, with apex tapered and sharply acute.

FEMALE TERMINALIA. Sternite VII (Fig. 5A, C), in ventral view, 2.4× as wide as long; posterolateral angles rounded and weakly produced posterad; posterior margin almost straight and slightly excavated medially. Internal sternite VIII membranous. Pygofer (Fig. 5A–B), in lateral view, approximately 2× as long as high; macrosetae distributed on posteroventral quadrant; apex rounded. First valvifer (Fig. 5D) subelliptic, slightly higher than wide. First valvula (Fig. 5D) 10× as long as high; ventral interlocking device long, reaching apical fifth; dorsal sculptured area areolate; apical portion (Fig. 5E) gradually tapering to apex; apex acute and areolate. Second valvula (Fig. 5F) 10.5× as long as high; dorsal protuberance reduced and acute, localized before midlength of blade; apical portion (Fig. 5G) of dorsal margin with a larger tooth followed by small denticles, approximately regular in shape and size; ventroapical margin with minute rounded denticles; apex rounded. Second valvifer (Fig. 5H), in lateral view, approximately 2.5× as high as wide. Gonoplac (Fig. 5H) 5.4× as long as high; dorsoapical margin straight, longer than one-third of gonoplac length; ventral margin evenly rounded, with a few short setae; outer surface (Fig. 5I) with many integumentary denticles; rounded apex.

### Remarks

*Costanana cifi* sp. nov. is similar in coloration to *C. nupera* comb. nov. in having the costal margin of the forewing with a small and slender yellow macula on the anterior fifth followed by a sequence of small yellowish spots and a larger white macula at the apex of the outer apical cell (Figs 4D, 20A). *Costanana cifi* can be separated from the other species of *Costanana* by the unusual shape of the aedeagus, with a short subapical spiniform process on the dorsal margin and a pair of long subapical processes directed dorsally and curved anterad (Fig. 4L).

*Costanana luzi* sp. nov.

[urn:lsid:zoobank.org:act:7C5C362D-1771-4550-A0BC-D58A2C2A80C2](https://doi.org/10.21203/rs.3.rs-17714550/v1)

Figs 6, 11G–H

### Diagnosis

Coloration (Fig. 11G) of head and pronotum reddish-brown without black maculae, forewing costal margin with narrow light yellow macula on anterior third, depigmented (white) macula on apical third absent. Style (Fig. 6K) with dentiform process near base of blade; dorsal margin strongly produced medially, forming a triangular process. Aedeagus (Fig. 6L–M) without processes near base; shaft compressed, with pair of long subapical processes directed basally, branched near base, with ventral ramus half as long as dorsal ramus; apex rounded with pair of short spiniform processes directed dorsally.

### Etymology

The new species name is in honor to Prof. Dr José Roberto Pujol Luz of the Universidade de Brasília who collected the holotype.

### Material examined

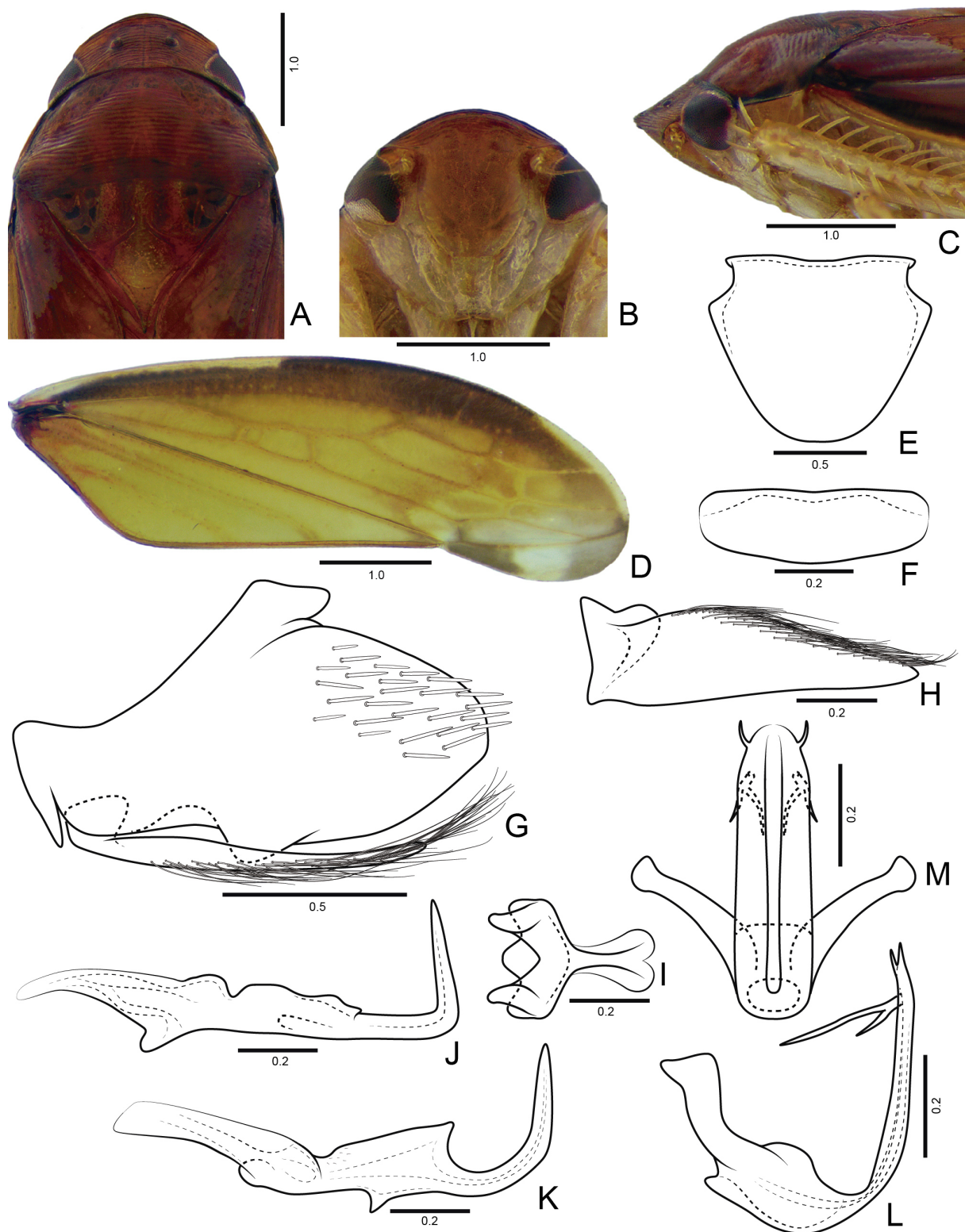
#### Holotype

BRAZIL • ♂; “Brasil, Brasília - DF [Distrito Federal], \ Fazenda Água Limpa, \ M. [Mata de] Galeria, malaise, 09- \ 23.XI.2017, J.R.P. Luz”; DZUP 215489.

### Description

#### Male

MEASUREMENTS. Holotype male: total length 7.1 mm.



**Fig. 6.** *Costanana luzi* sp. nov., holotype, ♂ (DZUP 215489). **A.** Head and thorax, dorsal view. **B.** Head, ventral view. **C.** Head and thorax, lateral view. **D.** Forewing. **E–M.** Male terminalia. **E.** Sternite VIII, ventral view. **F.** Valve, anterior view. **G.** Pygofer, valve and subgenital plate, lateral view. **H.** Subgenital plate, ventral view. **I.** Connective, dorsal view. **J.** Style, dorsal view. **K.** Style, lateral view. **L.** Aedeagus, lateral view. **M.** Aedeagus, posterior view. Scale bars in mm.



**COLORATION.** Dorsal portion of head and thorax reddish (Figs 6A, C, 11G); ventral portion yellow (Figs 6B–C, 11H). Crown (Fig. 6A) without markings; eyes and ocelli red. Pronotum (Fig. 6A) with lateral margins black. Scutellum yellowish. Face (Fig. 6B) with frons reddish. Forewing (Fig. 6D) costal margin dark brown, long and slender yellow macula on anterior half and apical fourth; appendix smoky with median whitish macula. Legs (Figs 4C, 11H) yellow, without black markings.

**STRUCTURE.** Head in dorsal view (Fig. 6A): median length of crown as long as half interocular width; transocular width of head 7.5 tenths of humeral width of pronotum; in lateral view (Fig. 6C), with anterior margin moderately thin, with 5–6 well developed carinae. Forewing (Fig. 6D) with inner discal cell very short, one-third as long as outer discal cell; apex slightly tapered. Profemur AV row with 4–5 setae restricted to basal half and PV row with 1 apical seta. Protibia PD row with 3 long setae and apical PD<sub>1</sub> seta developed; PV row developed, with 8 setae increasing in thickness and length towards apex. Metatibia rows PD, AD, and AV with 18–19, 13, and 12 macrosetae, respectively. Metatarsomere I apex with 3 platellae. Metatarsomere II apex with 2 apical platellae. Other characteristics as in the generic description.

**MALE TERMINALIA.** Sternite VIII (Fig. 6E) 1.3× as wide as long; lateral margins excavated at base, forming a triangular projection; apex broadly rounded. Valve (Fig. 6F) 3.1× as wide as long; posterior margin almost straight. Pygofer (Fig. 6G), in lateral view, 1.7× as long as maximum height; ventral margin with rounded protrusion near midlength; posterodorsal and ventral margins rounded; macrosetae distributed on dorsoapical quadrant; apex slightly tapered and rounded. Subgenital plate (Fig. 6G), in lateral view, surpassing half length of pygofer; in ventral view (Fig. 6H), 3.5× as long as wide; inner margin straight; external margin rounded on basal half; external margin with long filiform setae; apex strongly tapered and weakly sclerotized. Connective (Fig. 6I) Y-shaped; arms produced laterally; stalk shorter than maximum width of arms, widened apically; median keel weakly developed. Style (Fig. 6J), in dorsal view, with outer lobe reduced and rounded; apical portion directed outward; in lateral view (Fig. 6K), ventral margin not serrated, with dentiform process near base of blade; dorsal margin strongly produced on basal half, forming a triangular process; apical portion slender, curved dorsally; apex acute. Aedeagus (Fig. 6L–M) preatrium not developed; dorsal apodeme strongly elongated laterally, forming divergent and truncated apices; shaft compressed, curved dorsally; pair of long subapical processes directed basally, branched near base, ventral ramus half as long as dorsal ramus; apex rounded with pair of short spiniform processes directed dorsally.

#### **Female**

Unknown.

#### **Remarks**

*Costanana luzi* sp. nov. is most similar to *C. praecellens* in having the same color pattern (Figs 11G–H, 13C–D) and the aedeagal shaft compressed and bearing a pair of subapical processes branched near the base (Fig. 6L), and the apex of the aedeagus rounded with pair of short spiniform processes directed dorsally (Fig. 6M). The new species can easily be separated from *C. praecellens* in having the style with a process on the dorsal margin of the blade and the distal portion longer and distinctly more curved (Fig. 6K), and the branched subapical process of the aedeagus with the ventral ramus half as long as the dorsal ramus (Fig. 6L–M).

#### ***Costanana obtusa* sp. nov.**

[urn:lsid:zoobank.org:act:6C9FE23A-E57D-440D-8C41-93B9E2934678](https://zoobank.org/act:6C9FE23A-E57D-440D-8C41-93B9E2934678)

Figs 7, 12A–B

#### **Diagnosis**

Coloration (Fig. 12A) of head and pronotum brown with black maculae, forewing costal margin with broad light yellow macula on anterior third and large depigmented (white) macula on apical third. Style

(Fig. 7K) with ventral dentiform process near base of blade; apex truncated. Aedeagus (Fig. 7L–M) without processes near base; shaft slender with pair of long filiform subapical processes directed basally, with one or two spurs near base; apex of shaft spatulate and rounded.

### Etymology

The species epithet '*obtusa*' refers to the unusual apex of the style being truncated.

### Material examined

#### Holotype

BRAZIL • ♂; "Brasil, Bahia, \ Encruzilhada \ XII.1980 \ M. Alvarenga"; DZUP 215492.

### Description

#### Male

MEASUREMENTS. Holotype male: total length 6.8 mm.

COLORATION. Dorsal portion of head and thorax brown (Figs 7A, C, 12A); ventral portion yellow (Figs 7B–C, 12B). Crown (Fig. 7A) almost completely black, except median line and posterior margin brown; pair of rounded black spots behind ocelli, near posterior margin; eyes and ocelli red. Pronotum (Fig. 7A) with black irregular maculae near anterior margin; lateral margins yellow. Face (Fig. 7B) with frons brownish. Forewing (Fig. 7D) with large triangular light yellow macula on anterior half of costal margin and a large rounded depigmented (white) macula at level of outer antepical cell, remaining portion of costal cell, apical cells, apex of clavus and appendix dark brown; apical margin yellow-brown.

STRUCTURE. Head in dorsal view (Fig. 7A): median length of crown as long as interocular width; transocular width of head 8.2 tenths humeral width of pronotum; in lateral view (Fig. 7C), with anterior margin thick, with 7–8 well developed carinae. Forewing (Fig. 7D) inner discal cell open, m-cu<sub>2</sub> crossvein absent; apex broadly rounded. Other characteristics as in the generic description.

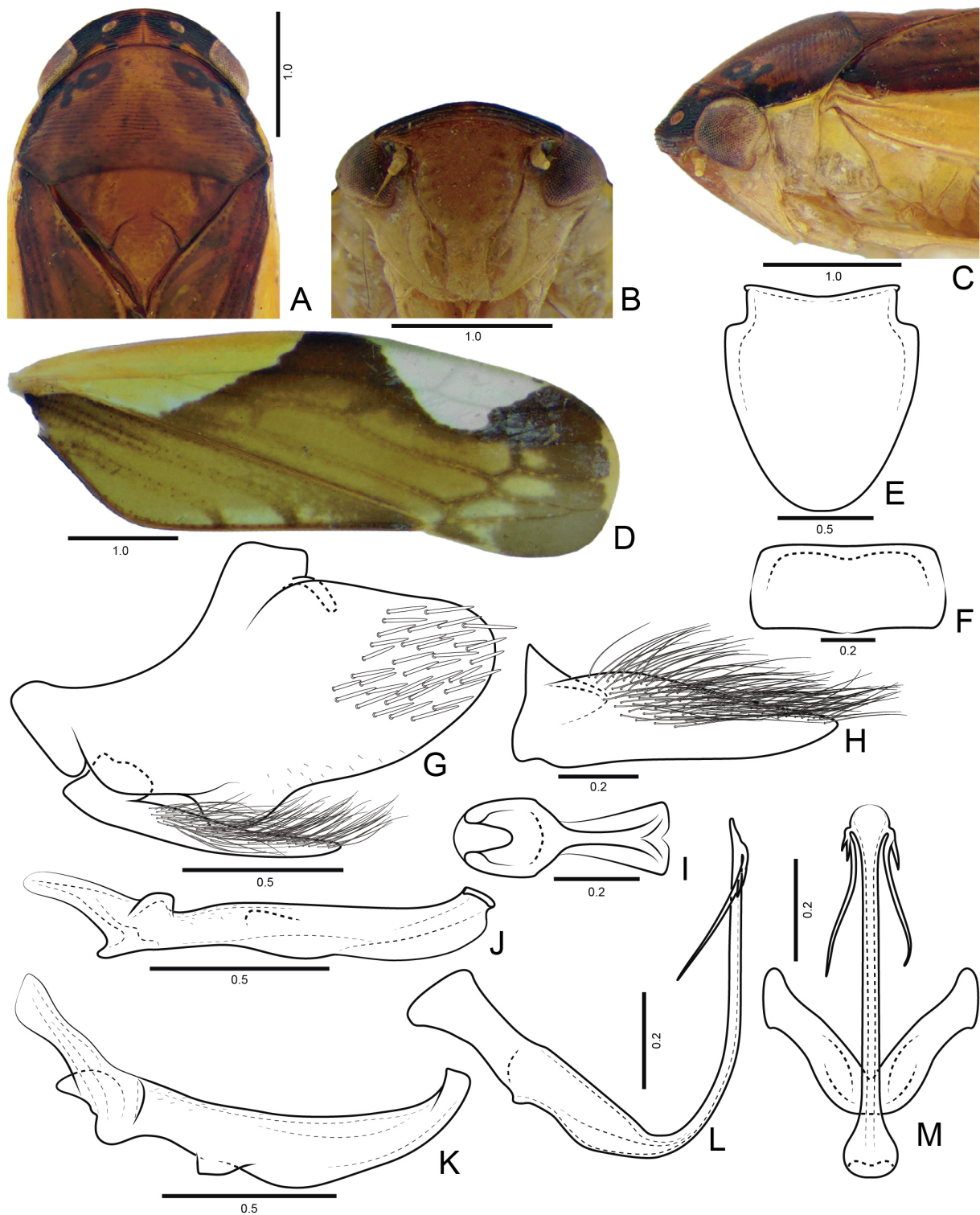
MALE TERMINALIA. Sternite VIII (Fig. 7E) 1.1× as long as wide; lateral margins excavated at base, forming a triangular projection; apex rounded. Valve (Fig. 7F) 2.2× as wide as long; posterior margin almost straight and weakly emarginated medially. Pygofer (Fig. 7G), in lateral view, 1.8× as long as maximum height; basodorsal process present but weakly developed; ventral margin with rounded protrusion near midlength; posterodorsal and ventral margins rounded; external surface near ventral margin with short filiform setae; macrosetae distributed on posterior half; apex broadly rounded. Subgenital plate (Fig. 7G), in lateral view, slightly surpassing half length of pygofer; in ventral view (Fig. 7H), 3.5× as long as wide; inner margin straight; external margin slightly rounded on basal half; ventral surface and external margin with long filiform setae; apex tapered and weakly sclerotized. Connective (Fig. 7I) approximately linear; arms not produced laterally; stalk longer than maximum width of arms, widened apically; median keel weakly developed. Style (Fig. 7J), in dorsal view, with outer lobe reduced and subtruncated; in lateral view (Fig. 7K), blade broadened medially; ventral margin not serrated, with dentiform process near base of blade; apex truncated. Aedeagus (Fig. 7L–M) preatrium not developed; dorsal apodeme strongly elongated laterally, forming divergent and truncated apices; shaft slender, curved dorsally; pair of long filiform subapical processes directed basally, with one or two spurs near base; apex spatulate and rounded.

#### Female

Unknown.

### Remarks

*Costanana obtusa* sp. nov. is most similar to *C. piraquarensis* sp. nov. in having a similar color pattern (Fig. 12A–D), especially the pair of large maculae on the costal margin of the forewing (Figs 7D, 8D)



**Fig. 7.** *Costanana obtusa* sp. nov., holotype, ♂ (DZUP215492). **A.** Head and thorax, dorsal view. **B.** Head, ventral view. **C.** Head and thorax, lateral view. **D.** Forewing. **E–M.** Male terminalia. **E.** Sternite VIII, ventral view. **F.** Valve, anterior view. **G.** Pygofer, valve and subgenital plate, lateral view. **H.** Subgenital plate, ventral view. **I.** Connective, dorsal view. **J.** Style, dorsal view. **K.** Style, lateral view. **L.** Aedeagus, lateral view. **M.** Aedeagus, posterior view. Scale bars in mm.

and the general shape of the pygofer, style, connective and aedeagus (Figs 7G–M, 8G–M). *Costanana obtusa* is separated from *C. piraquarensis* in having the following differences: (1) apex of pygofer rounded (Fig. 7G); (2) connective longer (Fig. 7I); (3) style with apex truncated (Fig. 7K); (4) aedeagal shaft slender (Fig. 7L–M); and (5) subapical pair of processes having one or two spurs near the base (Fig. 7M). Unfortunately the legs of the holotype are missing but, due to the distinctly different genitalia and the lack of importance for species delimitation of the morphology of the legs, we suppose this does not prejudice the description or future recognition of this species.

*Costanana piraquarensis* sp. nov.

[urn:lsid:zoobank.org:act:2C43F789-61AF-4CBF-8944-1F2791A6E0C3](https://zoobank.org/act:2C43F789-61AF-4CBF-8944-1F2791A6E0C3)

Figs 8, 12C–D

### Diagnosis

Coloration (Fig. 12C) of head and pronotum dark brown with black maculae, forewing costal margin with broad light yellow macula on anterior third and large depigmented (white) macula on apical third. Style (Fig. 8K) with ventral dentiform process near base of blade; apex abruptly tapered and acute. Aedeagus (Fig. 8L–M) without processes near base; shaft moderately slender, with pair of long filiform subapical processes directed basally, almost as long as shaft length; apex weakly compressed, subacute.

### Etymology

The new species name refers to the municipality of Piraquara, where the holotype was collected.

### Material examined

#### Holotype

BRAZIL • ♂; “Brasil, PR [Paraná], Piraquara, \ Mananciais da Serra, \ 25.4967°S, 48.9839°W, \ 1010m, malaise \ 01-16.II.2019, G. Melo \ & A. Martins leg.”; DZUP 215485.

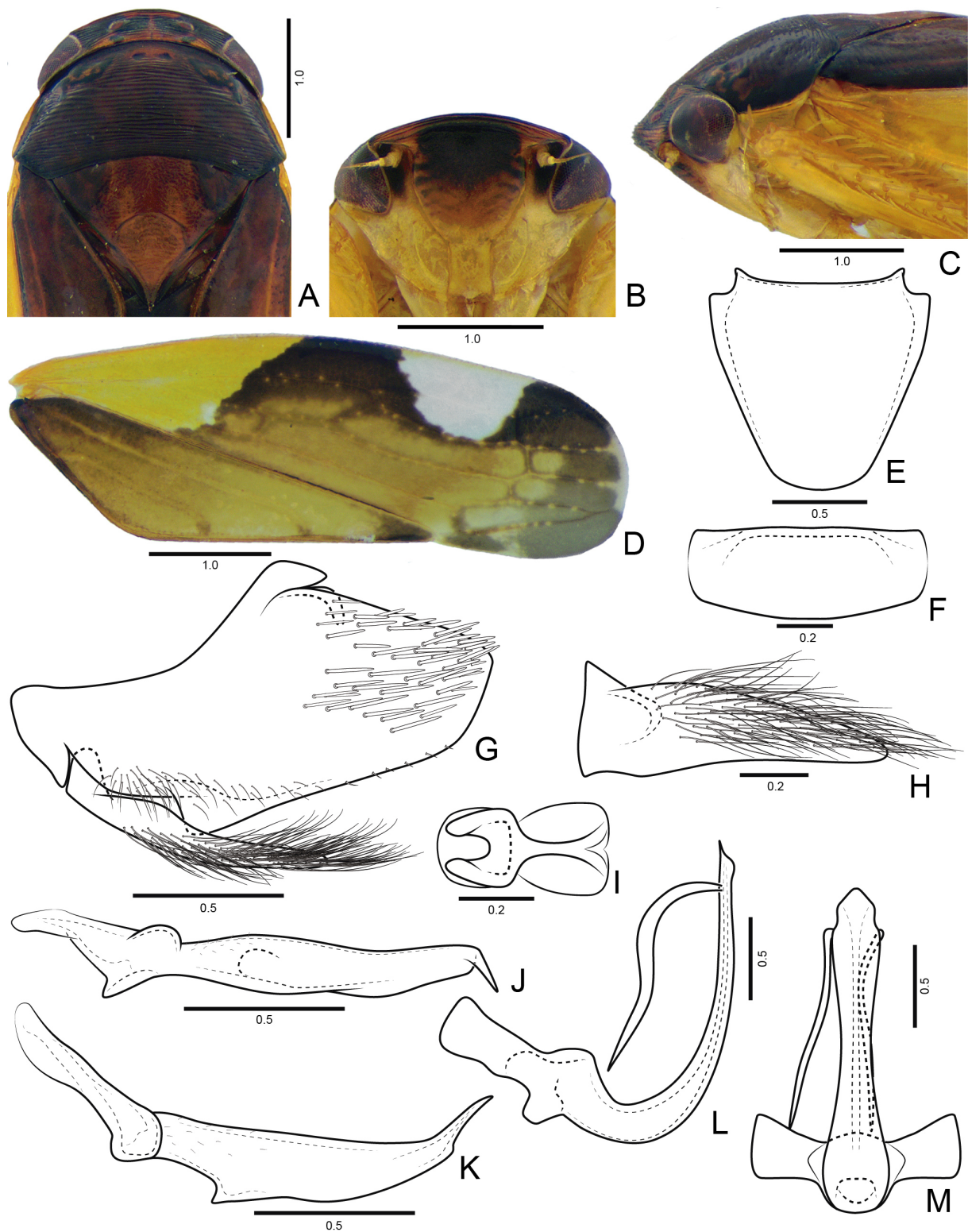
### Description

#### Male

MEASUREMENTS. Holotype male: total length 6.9 mm.

COLORATION. Dorsal portion of head and thorax brown (Figs 8A, C, 12C); ventral portion yellow (Figs 8B–C, 12D). Crown (Fig. 8A) reddish-brown; transverse black stripe interrupted medially over median line; pair of rounded black spots behind ocelli, near posterior margin; eyes and ocelli red. Pronotum (Fig. 8A) dark brown; black irregular maculae and reddish-brown areas near anterior margin; lateral margin yellow. Mesonotum lateral angles dark brown. Face (Fig. 8B) with frons brownish, dorsal portion black, short black stripes over muscle impressions; gena black between eye and frons. Forewing (Fig. 8D) with large triangular light yellow macula on anterior third of costal margin and large rounded depigmented (white) macula at level of outer anteapical cell; remaining portion of costal cell, apical cells, apex of clavus and appendix dark brown; apical margin whitish. Legs (Fig. 12D) yellow; apex of metatibia dark brown.

STRUCTURE. Head in dorsal view (Fig. 8A): median length of crown slightly shorter than interocular width; transocular width of head eight tenths humeral width of pronotum; in lateral view (Fig. 8C), with anterior margin thick, with 5–6 well developed carinae. Forewing (Fig. 8D) inner discal cell open, m-cu<sub>2</sub> crossvein absent; apex broadly rounded. Profemur AV row with 3–4 setae restricted to basal half and PV row with 1 apical seta. Protibia PD row with 4 long setae and apical PD<sub>1</sub> seta developed; PV row developed, with 8 setae increasing in thickness and length towards apex. Metatibia rows PD, AD, and AV with 24–25, 14, and 15 macrosetae, respectively. Metatarsomere I apex with 4 platellae. Metatarsomere II apex with 2 apical platellae. Other characteristics as in the generic description.



**Fig. 8.** *Costanana piraquarensis* sp. nov., holotype, ♂ (DZUP 215485). A. Head and thorax, dorsal view. B. Head, ventral view. C. Head and thorax, lateral view. D. Forewing. E–M. Male terminalia. E. Sternite VIII, ventral view. F. Valve, anterior view. G. Pygofer, valve and subgenital plate, lateral view. H. Subgenital plate, ventral view. I. Connective, dorsal view. J. Style, dorsal view. K. Style, lateral view. L. Aedeagus, lateral view. M. Aedeagus, posterior view. Scale bars in mm.

**MALE TERMINALIA.** Sternite VIII (Fig. 8E) 1.1× as wide as long; lateral margins excavated at base, forming a triangular projection and then converging to rounded apex. Valve (Fig. 8F) 2.7× as wide as long; posterior margin almost straight. Pygofer (Fig. 8G), in lateral view, 1.8× as long as maximum height; basodorsal process present but weakly developed; ventral margin with rounded protrusion near basal third; posterodorsal and ventral margins straight; external surface near ventral margin with short filiform setae; macrosetae distributed on posterodorsal quadrant; apex broad and truncate. Subgenital plate (Fig. 8G), in lateral view, slightly surpassing half length of pygofer; in ventral view (Fig. 8H), 3.2× as long as wide; inner margin straight; external margin slightly rounded; ventral surface and external margin with long filiform setae; apex tapered and weakly sclerotized. Connective (Fig. 8I) linear; arms not produced laterally; stalk very broad, slightly longer than maximum width of arms; median keel weakly developed. Style (Fig. 8J), in dorsal view, with outer lobe reduced and rounded; in lateral view (Fig. 8K), blade broadened medially; ventral margin not serrated, with dentiform process near base of blade; apex abruptly tapered, slightly directed dorsally, acute. Aedeagus (Fig. 8L–M) preatrium not developed; dorsal apodeme elongated laterally, forming divergent and truncated apices; shaft slender, curved dorsally; pair of long subapical filiform processes directed basally, almost as long as shaft length; apex compressed, subacute.

#### **Female**

Unknown.

#### **Remarks**

*Costanana piraquarensis* sp. nov. is separated from *C. obtusa* sp. nov. in having the following differences: (1) apex of pygofer truncated (Fig. 8G); (2) connective shorter (Fig. 8I); (3) style with apex acute (Fig. 8K); (4) aedeagal shaft wider (Fig. 8L–M); and (5) subapical pair of processes lacking spurs near base (Fig. 8M). See also the remarks on *C. obtusa*.

#### *Costanana rubromarginata* sp. nov.

[urn:lsid:zoobank.org:act:5120C9B2-98F9-4CE9-9FC6-C663FC76165A](https://zoobank.org/urn:lsid:zoobank.org:act:5120C9B2-98F9-4CE9-9FC6-C663FC76165A)

Figs 9, 12E–F

#### **Diagnosis**

Coloration (Fig. 12E) of crown black with anterior margin red, pronotum brown with small black maculae, forewing costal margin with narrow light yellow macula on anterior third and small depigmented (white) macula on apical third. Style (Fig. 9K) slender and slightly broadened subapically, without processes near base of blade or apical portion. Aedeagus (Fig. 9L–M) shaft long and slender, cylindrical, curved anterad, without apical or subapical processes; pair of long and slender processes arising from basal third, parallel to shaft and slightly surpassing apex, abruptly enlarged at midlength.

#### **Etymology**

The species epithet refers to the anterior margin of head being red.

#### **Material examined**

##### **Holotype**

BRAZIL • ♂; “Brasil, MT [Mato Grosso], Cotriguaçu, \ Fazenda São Nicolau, 09.8559°S, 58.2486°W, \ 230m, sweep, 26-29.vi. \ 2017, A.C. Domahovski”; DZUP 215491.

##### **Paratype**

BRAZIL – Pará • 1 ♂; “Brasil Pará Benevides \ Benfica \ 08.VII.2017 Varredura \ W. F. Lima”, “CZDC UEPA \ 00012313”; CZJA.

## Description

### Male

MEASUREMENTS. Holotype male: total length 5.0 mm. Paratype male (n = 1) 5.0 mm.

COLORATION. Dorsal portion head and thorax reddish-brown (Figs 9A, C, 12E); ventral portion yellow (Figs 9B–C, 12F). Crown (Fig. 9A) black; anterior margin red; ocelli red. Face (Fig. 9B) with frons black; lorum black to dark brown; gena dark brown between eye and frons; clypeus dark brown except apex yellow. Pronotum (Fig. 9A) with black irregular maculae near anterior and lateral margins; lateral margins yellow. Mesonotum (Fig. 9A) lateral angles black; pair of black maculae submedially. Forewing (Fig. 9D) costal margin with elongate narrow light yellow macula on anterior third, small depigmented (white) macula on outer apical cell, remaining portion black; veins outlined by dark brown; outer half of corium, apex and appendix smoky. Legs (Fig. 11B) yellow, without black markings.

STRUCTURE. Head in dorsal view (Fig. 9A): median length of crown as long as half interocular width; transocular width of head 8.5 tenths humeral width of pronotum; in lateral view (Fig. 9C), with anterior margin moderately thick, with 5–6 well developed carinae. Forewing (Fig. 9D) with inner discal cell half long as outer discal cell; apex rounded. Profemur AV row with 4–5 setae restricted to basal half and PV row with 1 apical seta. Protibia PD row with 3 long setae and apical PD<sub>1</sub> seta developed; PV row developed, with 8 setae increasing in thickness and length towards apex. Metatibia rows PD, AD, and AV with 20–23, 12, and 13 macrosetae, respectively. Metatarsomere I apex with 3 platellae. Metatarsomere II apex with 2 apical platellae. Other characteristics as in the generic description.

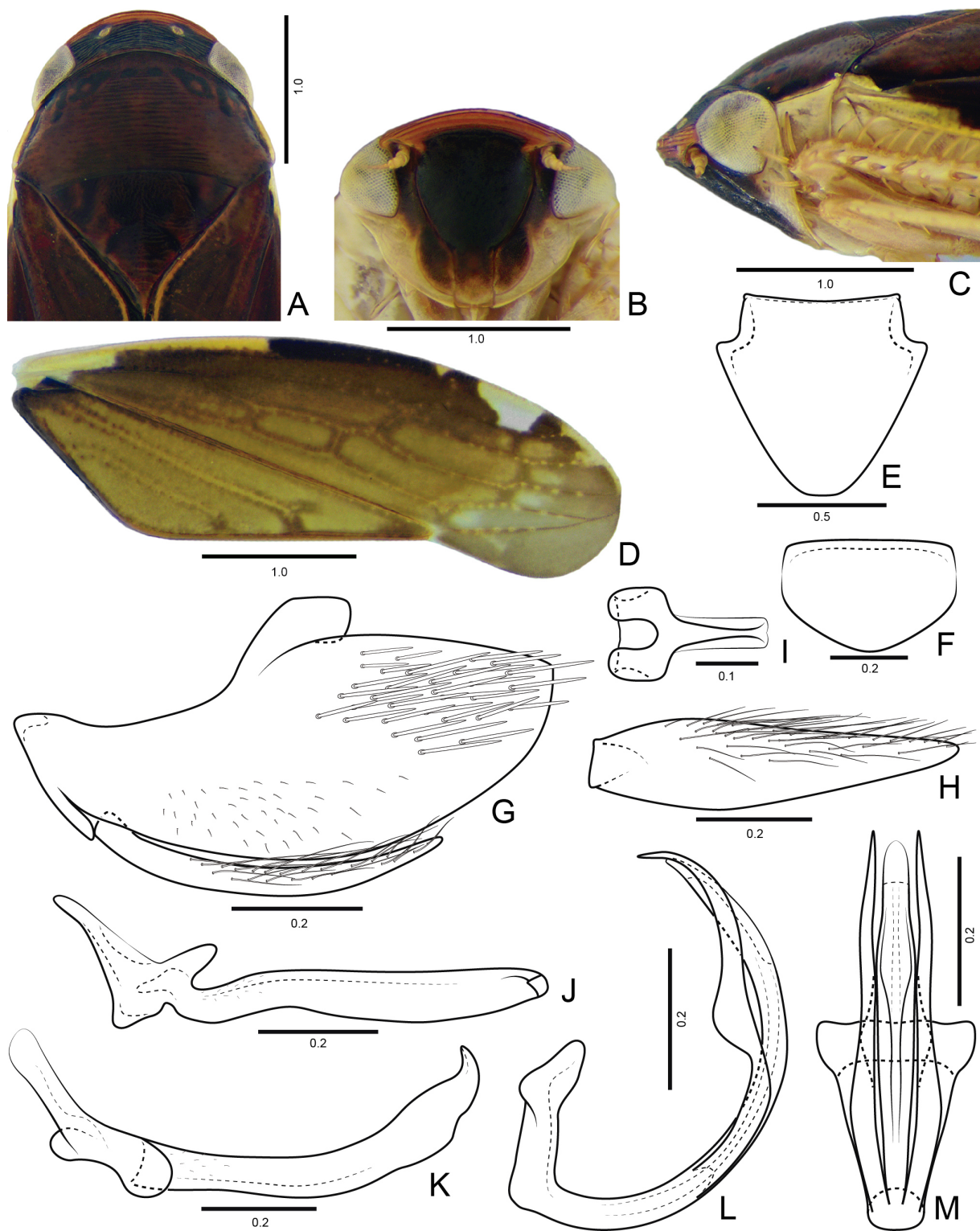
MALE TERMINALIA. Sternite VIII (Fig. 9E) 1.1× as wide as long; lateral margins excavated at base, forming a triangular projection and then converging to rounded apex. Valve (Fig. 9F) 1.6× as wide as long; posterior margin rounded. Pygofer (Fig. 9G), in lateral view, 2× as long as maximum height; ventral margin broadly rounded; posterodorsal margin approximately straight; external surface near ventral margin with short filiform setae; macrosetae distributed on posterodorsal quadrant; apex slightly tapered and almost truncate. Subgenital plate (Fig. 9G), in lateral view, surpassing half length of pygofer; in ventral view (Fig. 9H), 4× as long as wide; lateral margins slightly rounded; ventral surface and external margin with long filiform setae; apex tapered and weakly sclerotized. Connective (Fig. 9I) T-shaped; arms weakly produced laterally; stalk narrow, slightly shorter than maximum width or arms; median keel weakly developed. Style (Fig. 9J), in dorsal view, with outer lobe well developed, rounded; in lateral view (Fig. 9K), blade slender, evenly curved dorsally, slightly broadened subapically; ventral margin not serrated; apex tapered, curved dorsally and acute. Aedeagus (Fig. 9L–M) preatrium not developed; dorsal apodeme weakly produced laterally, dorsal margin straight; shaft long and slender, cylindrical, curved anterad; pair of long and slender processes arising from basal third, parallel to shaft and slightly surpassing apex, enlarged at midlength and thin and acute apically; shaft without apical or subapical processes.

### Female

Unknown.

## Remarks

*Costanana rubromarginata* sp. nov. is similar to *C. helvacosta*, *C. nana* and *C. santana* in having the aedeagus with the shaft long and slender, with the pair of processes arising near the base of the shaft and without processes distally (Fig. 9L–M). The shape of the apex of the style, slightly expanded subapically (Fig. 9K), is most similar to that of *C. nana*, but the new species is separated in having the pair of lateral processes abruptly expanded medially and not parallel to the shaft along the entire length as in *C. nana*.



**Fig. 9.** *Costanana rubromarginata* sp. nov., holotype, ♂ (DZUP 215491). **A.** Head and thorax, dorsal view. **B.** Head, ventral view. **C.** Head and thorax, lateral view. **D.** Forewing. **E–M.** Male terminalia. **E.** Sternite VIII, ventral view. **F.** Valve, anterior view. **G.** Pygofer, valve and subgenital plate, lateral view. **H.** Subgenital plate, ventral view. **I.** Connective, dorsal view. **J.** Style, dorsal view. **K.** Style, lateral view. **L.** Aedeagus, lateral view. **M.** Aedeagus, posterior view. Scale bars in mm.



*Costanana xenomorpha* sp. nov.

[urn:lsid:zoobank.org:act:ED50364A-7B8F-4082-85EA-214F8FE69F01](https://zoobank.org/act:ED50364A-7B8F-4082-85EA-214F8FE69F01)

Figs 10, 12G–H

**Diagnosis**

Coloration (Fig. 12G) of head and pronotum brown with small black maculae, forewing costal margin with broad light yellow macula on anterior third and large depigmented (white) macula on apical third. Style (Fig. 10K) blade without processes near base or apical portion, ventral margin serrated; apex abruptly curved dorsally. Aedeagus (Fig. 10L–M) without processes near base; apical portion with four pairs of lateral processes and an unpaired subapical process on ventral surface.

**Etymology**

The new species name comes from the Greek ‘*xeno*’ (‘strange’, ‘unusual’) + ‘*morpha*’ (‘form’, ‘shape’). It refers to the unusual shape of the male genital structures. It also alludes to the fictional extraterrestrial “xenomorphs” from the classic film “Alien”, due to the aedeagus, in posterior view, resembling the creature named “face hugger”.

**Material examined**

**Holotype**

PERU • ♂; “Peru, Cuzco, Ttio, \30.viii.2012, (Light) \13°31’69”S 70°53’79”W, \2000m/R.R. Cavichioli leg.”, “DZUP 215490”; MUSM.

**Description**

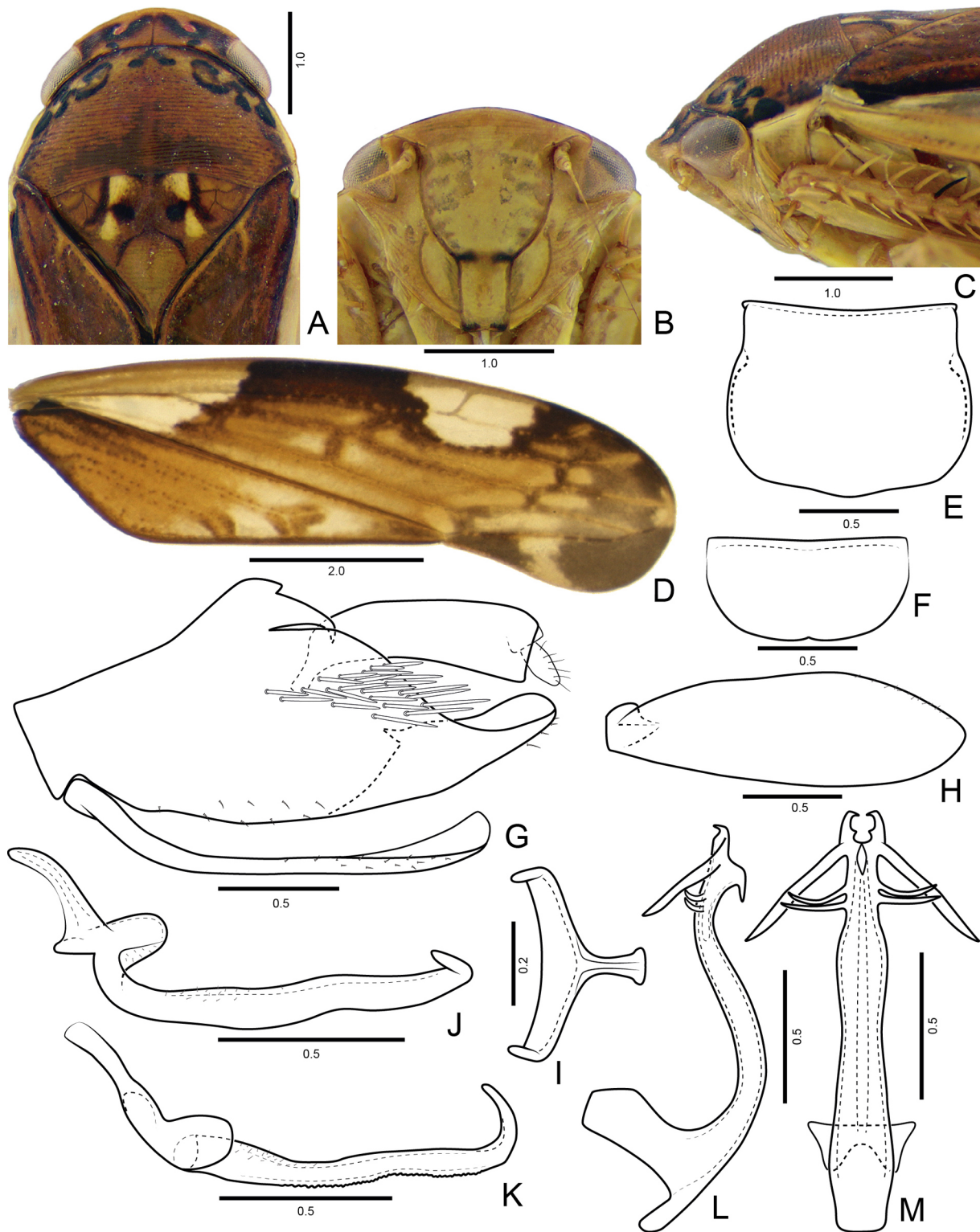
**Male**

MEASUREMENTS. Holotype male: total length 9.3 mm.

COLORATION. Dorsal portion of head and thorax light brown (Figs 10A, C, 12G); ventral portion yellow (Figs 8B–C, 12H). Crown (Fig. 10A) with transverse irregular black stripe; pair of rounded black spots behind ocelli, near posterior margin; ocelli red. Pronotum (Fig. 10A) with black irregular maculae and yellow areas near anterior margin; lateral margin yellow. Mesonotum (Fig. 10A) with two pairs of black and two pairs of yellow submedian maculae. Face (Fig. 10B) epistomal suture and apex of clypeus with pair of lateral black maculae. Forewing (Fig. 10D) costal margin with large triangular light yellow macula on anterior fourth and a large rounded depigmented (white) macula at level of outer anteapical cell, remaining portion of costal cell, apical cells, apex of clavus and appendix dark brown; apical portion of clavus yellowish. Legs (Fig. 12H) yellow with apex of tibiae dark brown.

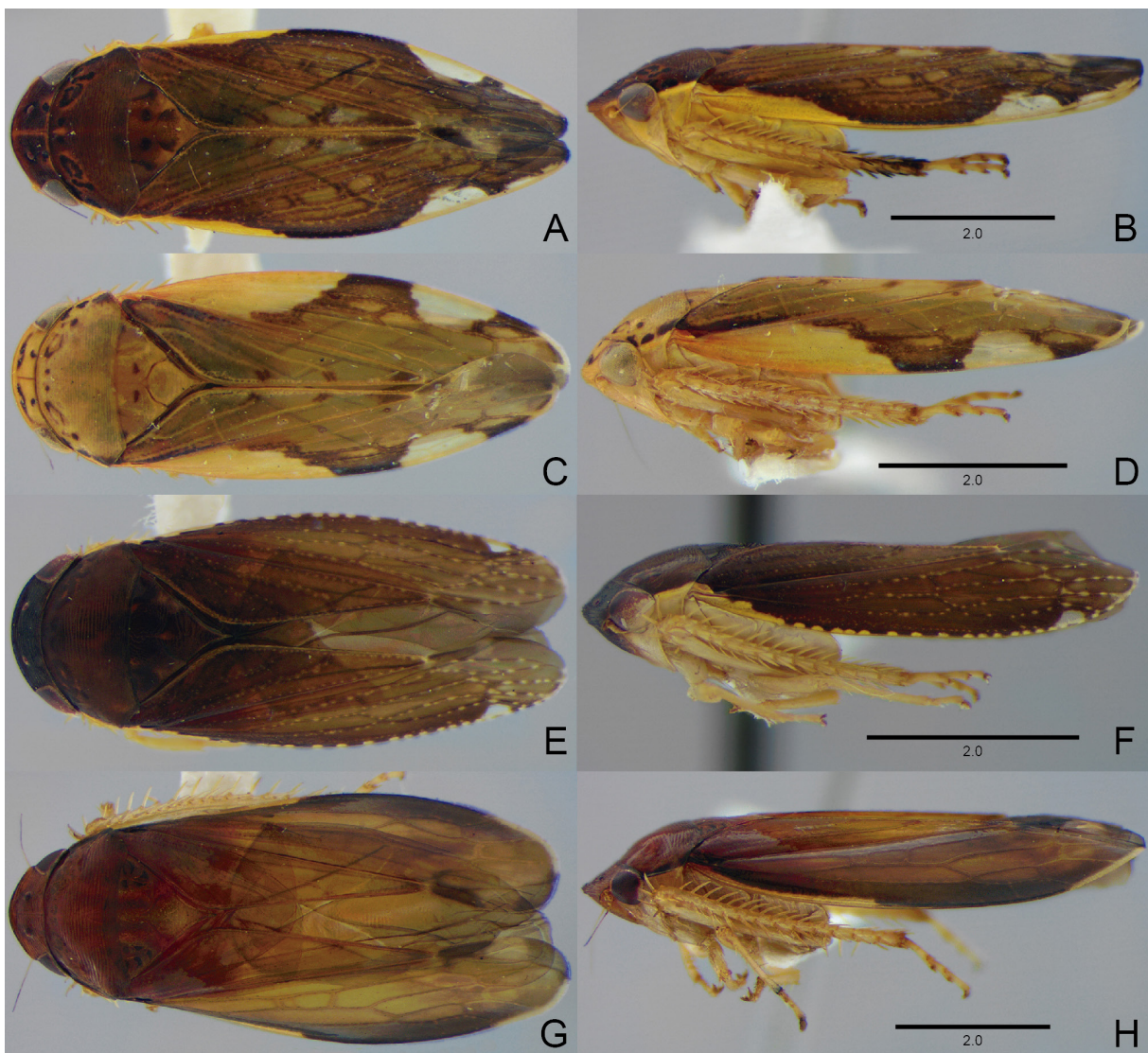
STRUCTURE. Head in dorsal view (Fig. 10A): median length shorter than interocular width; transocular width of head eight tenths humeral width of pronotum; in lateral view (Fig. 10C), with anterior margin thick, with 7–8 carinae. Forewing (Fig. 10D) with inner discal cell not distinctly shorter than outer discal cell; apex rounded. Profemur AV row with 6 setae restricted to basal half and PV row with about 10 setae distributed from base to apex. Protibia PD row with 4 long setae and apical PD<sub>1</sub> seta developed; PV row developed, with 6–7 setae increasing in thickness and length towards apex. Metatibia rows PD, AD, and AV with 23, 13, and 15 macrosetae, respectively. Metatarsomere I apex with 3 platellae. Metatarsomere II apex with 2 apical platellae. Other characteristics as in the generic description.

MALE TERMINALIA. Sternite VIII (Fig. 10E) 1.3× as wide as long; lateral margins straight and parallel at basal fourth and rounded distally; posterolateral angles rounded; posterior margin almost straight, weakly produced medially. Valve (Fig. 10F) 2× as wide as long; posterior margin rounded, weakly emarginated medially. Pygofer (Fig. 10G), in lateral view, 2× as long as maximum height; basodorsal



**Fig. 10.** *Costanana xenomorpha* sp. nov., holotype, ♂ (MUSM). **A.** Head and thorax, dorsal view. **B.** Head, ventral view. **C.** Head and thorax, lateral view. **D.** Forewing. **E–M.** Male terminalia. **E.** Sternite VIII, ventral view. **F.** Valve, anterior view. **G.** Pygofer, valve and subgenital plate, lateral view. **H.** Subgenital plate, ventral view. **I.** Connective, dorsal view. **J.** Style, dorsal view. **K.** Style, lateral view. **L.** Aedeagus, lateral view. **M.** Aedeagus, posterior view. Scale bars in mm.

process present but weakly developed; ventral margin broadly rounded; posterodorsal margin excavated; external surface near ventral margin with a few short setae; macrosetae distributed on posterodorsal quadrant; apex produced and rounded, curved inwards, inner surface with short filiform setae and a small dentiform process. Anal tube (segment X) sclerotized, without processes. Subgenital plate (Fig. 10G), in lateral view, not surpassing apex of pygofer; in ventral view (Fig. 10H), 3.1× as long as wide, strongly broadened medially; lateral margins rounded; external margin with minute setae; apex rounded, well sclerotized. Connective (Fig. 10I) T-shaped; arms well produced laterally; stalk narrow, short, one-third as long as maximum width of arms; median keel weakly developed. Style (Fig. 10J), in dorsal view, with outer lobe well developed, rounded; in lateral view (Fig. 10K), blade slender, sinuous; ventral margin serrated; apex abruptly curved dorsally and acute. Aedeagus (Fig. 10L–M) preatrium weakly developed; dorsal apodeme produced dorsally but not laterally, dorsal margin straight; shaft long and slender, almost cylindrical, sigmoid; apical portion with four pairs of processes; two pairs of lateral processes adjacent

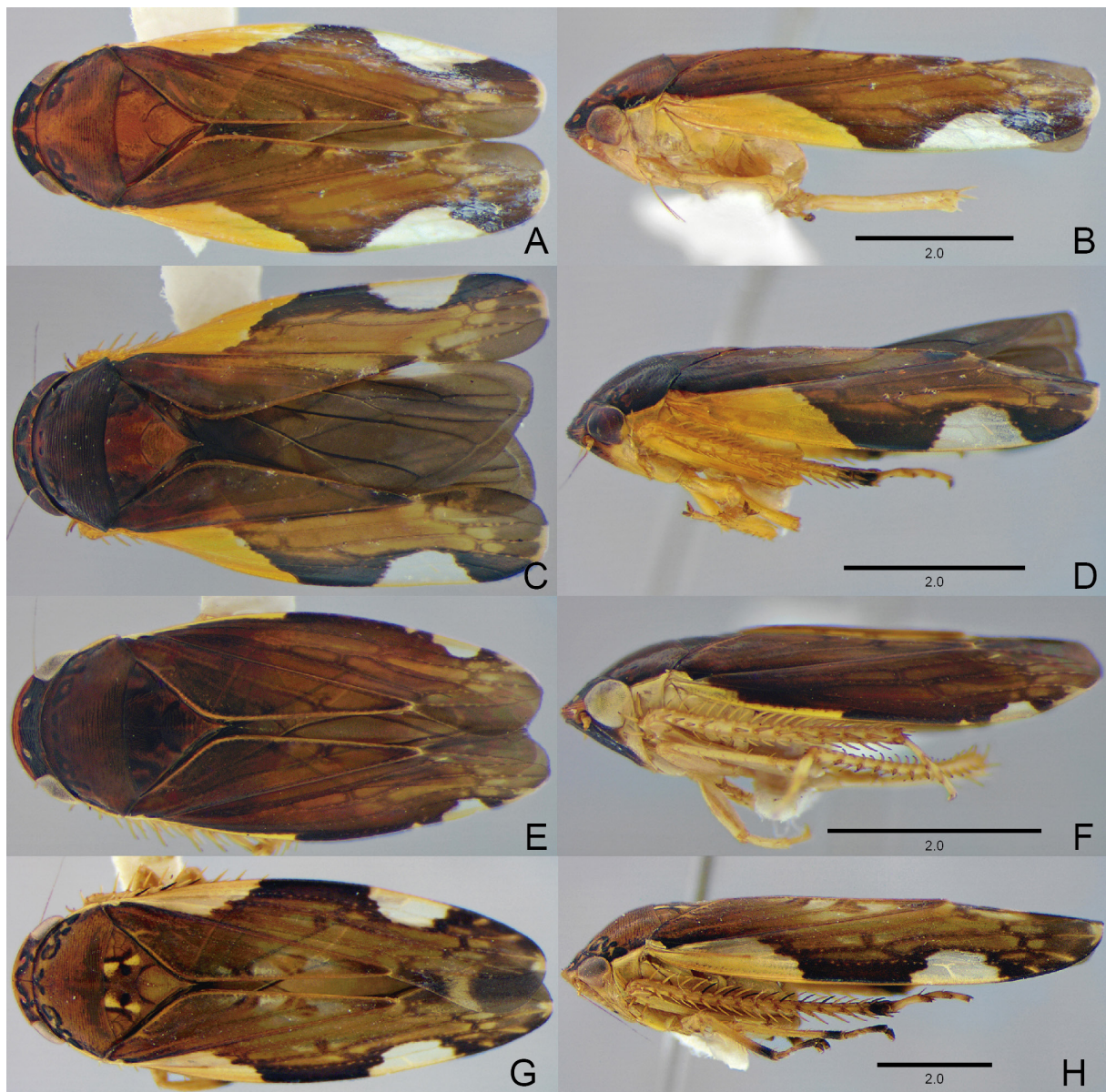


**Fig. 11.** Habitus of new species of *Costanana* DeLong & Freytag, 1972. Left, dorsal view; right, lateral view. **A–B.** *C. alata* sp. nov., holotype, ♂ (DZUP 215484). **C–D.** *C. bifida* sp. nov., holotype, ♂ (DZUP 215493). **E–F.** *C. cifti* sp. nov., holotype, ♂ (DZUP 215484). **G–H.** *C. luzi* sp. nov., holotype ♂ (DZUP 215489). Scale bars in mm.

to each other, directed laterally; long pair almost apical, thicker and longer than preceding ones, directed ventrolaterally; and a short apical claw-like pair directed dorsally; posterior surface with a unpaired subapical process curved ventrally.

**Female**

Unknown.



**Fig. 12.** Habitus of new species of *Costanana* DeLong & Freytag, 1972. Left, dorsal view; right, lateral view. **A–B.** *C. obtusa* sp. nov., holotype, ♂ (DZUP 215492). **C–D.** *C. piraquarensis* sp. nov., holotype, ♂ (DZUP 215485). **E–F.** *C. rubromarginata* sp. nov., holotype, ♂ (DZUP 215491). **G–H.** *C. xenomorpha* sp. nov., holotype, ♂ (MUSM). Scale bars in mm.

### Remarks

The male genitalia of *C. xenomorpha* sp. nov. differ in several aspects from those of the other species of *Costanana* as in the larger size of body (Fig. 12G–H); the shape of the sternite VIII, not tapered apically (Fig. 10E); the pygofer with apex curved inwards, bearing a spiniform process (Fig. 10G); the anal tube well sclerotized (Fig. 10G); the subgenital plate broadened subapically, well sclerotized distally, and lacking filiform setae (Fig. 10H); and the connective T-shaped with arms long (Fig. 10I). The shape of the subgenital plate and style is most similar to that of *C. dunda*. The new species can easily be recognized by the apex of the aedeagus with four pairs of lateral processes and a single subapical process on the ventral surface (Fig. 10M).

*Costanana flavina* DeLong & Freytag, 1972  
Figs 13A–B, 14

*Costanana flavina* DeLong & Freytag, 1972b: 496.

### Material examined

BRAZIL – **Paraná** (new record) • 47 ♂♂, 33 ♀♀; São José dos Pinhais; 25°36'18" S, 49°11'37" W; DZUP • 1 ♂, 1 ♀; Palmas; 26°33'26" S, 51°32'32" W; DZUP • 1 ♀; Piraquara, Mananciais da Serra; 25.9824° S, 48.9704° W; DZUP • 1 ♀; Parque Nacional Rio Azul; DZUP • 1 ♂; Tibagi, Parque Estadual do Guartelá; 24°33'47" S, 50°15'26" W; DZUP. – **Rio Grande do Sul** (new record) • Passo Fundo; 28°13'50.7" S 52°24'17.04" W; DZUP. – **Santa Catarina** • 1 ♀; Nova Teutonia; 27°11' S, 52°23' W; DZUP.

### Description

FEMALE TERMINALIA. Sternite VII (Fig. 14A, C), in ventral view, 2.2× as wide as long; posterolateral angles rounded and produced posterad; posterior margin with V-shaped notch at middle and deeply excavated laterad of broad median lobe, which occupies more than median third and is produced posteriorly, slightly surpassing lateral angles. Internal sternite VIII (Fig. 14D) partially sclerotized and with membranous portion pigmented. Pygofer (Fig. 14A–B), in lateral view, approximately 2.3× as long as high; macrosetae distributed on posteroventral quadrant; apex rounded. First valvifer (Fig. 14E) subelliptic, slightly higher than wide, anterodorsal and posteroventral angles rounded. First valvula (Fig. 14E) 10× as long as high; ventral interlocking device long, reaching apical fourth; dorsal sculptured area strigate; apical portion (Fig. 14F) gradually tapering to apex; apex acute and areolate. Second valvula (Fig. 14G) 12× as long as high; dorsal protuberance minute and rounded, localized before midlength of blade; apical portion (Fig. 14H) dorsal margin slightly excavated between dorsal protuberance and dentate apical portion, denticles small, approximately regular in shape and size and restricted to apical sixth; ventroapical margin with minute rounded denticles; apex rounded. Second valvifer (Fig. 14I) 2.5× as high as wide. Gonoplac (Fig. 14I) 5× as long as high; dorsoapical margin straight, longer than one-third of gonoplac length; ventral margin evenly rounded, with a few short setae; outer surface (Fig. 14J) with many integumentary denticles; rounded apex.

*Costanana praecellens* (Stål, 1862)  
Figs 13C–D, 15–17

*Gypona praecellens* Stål, 1862: 47.

*Costanana cella* DeLong & Freytag, 1972b: 497. **Syn. nov.**

*Costanana praecellens* – DeLong & Freytag 1972b: 499.

## Material examined

### Holotype

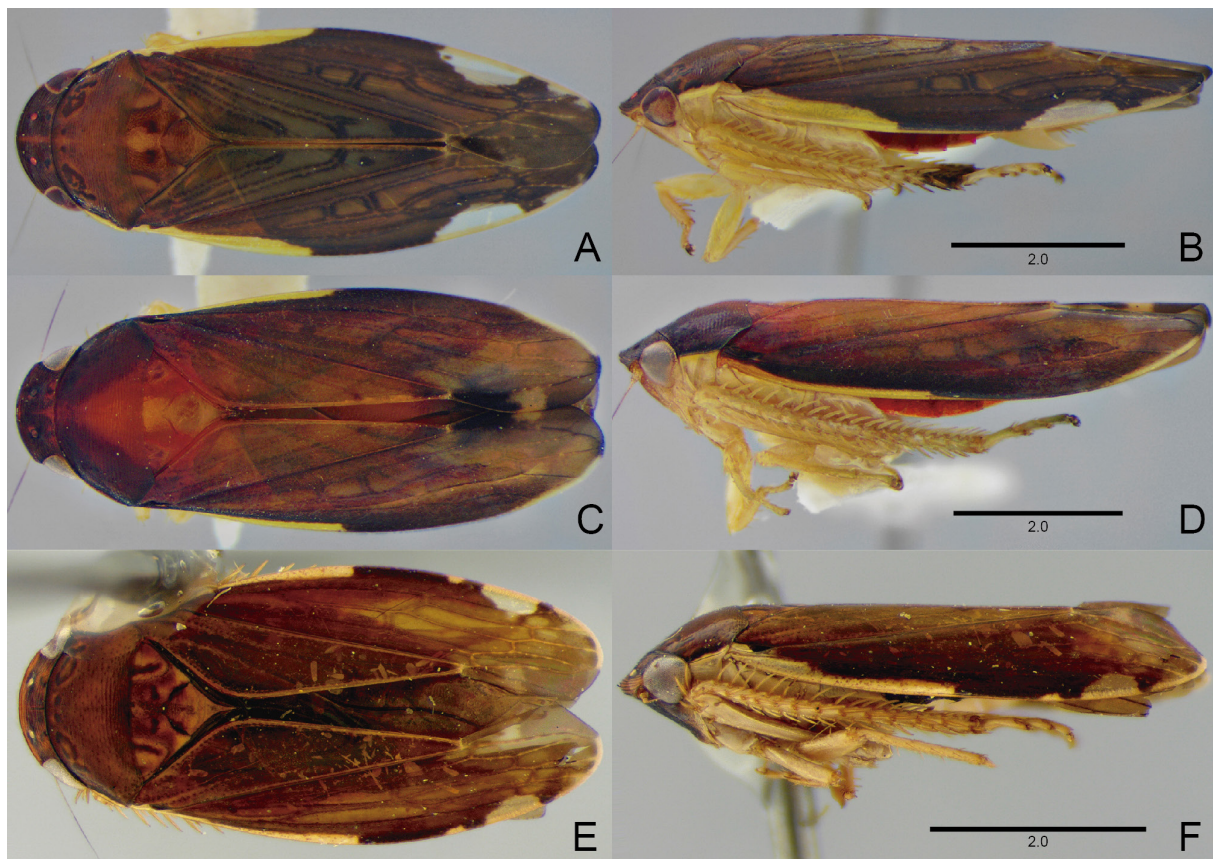
BRAZIL • ♀; “Brasil”, “NHRS-GULI \ 000097315”; NHRS 97315.

### Other material

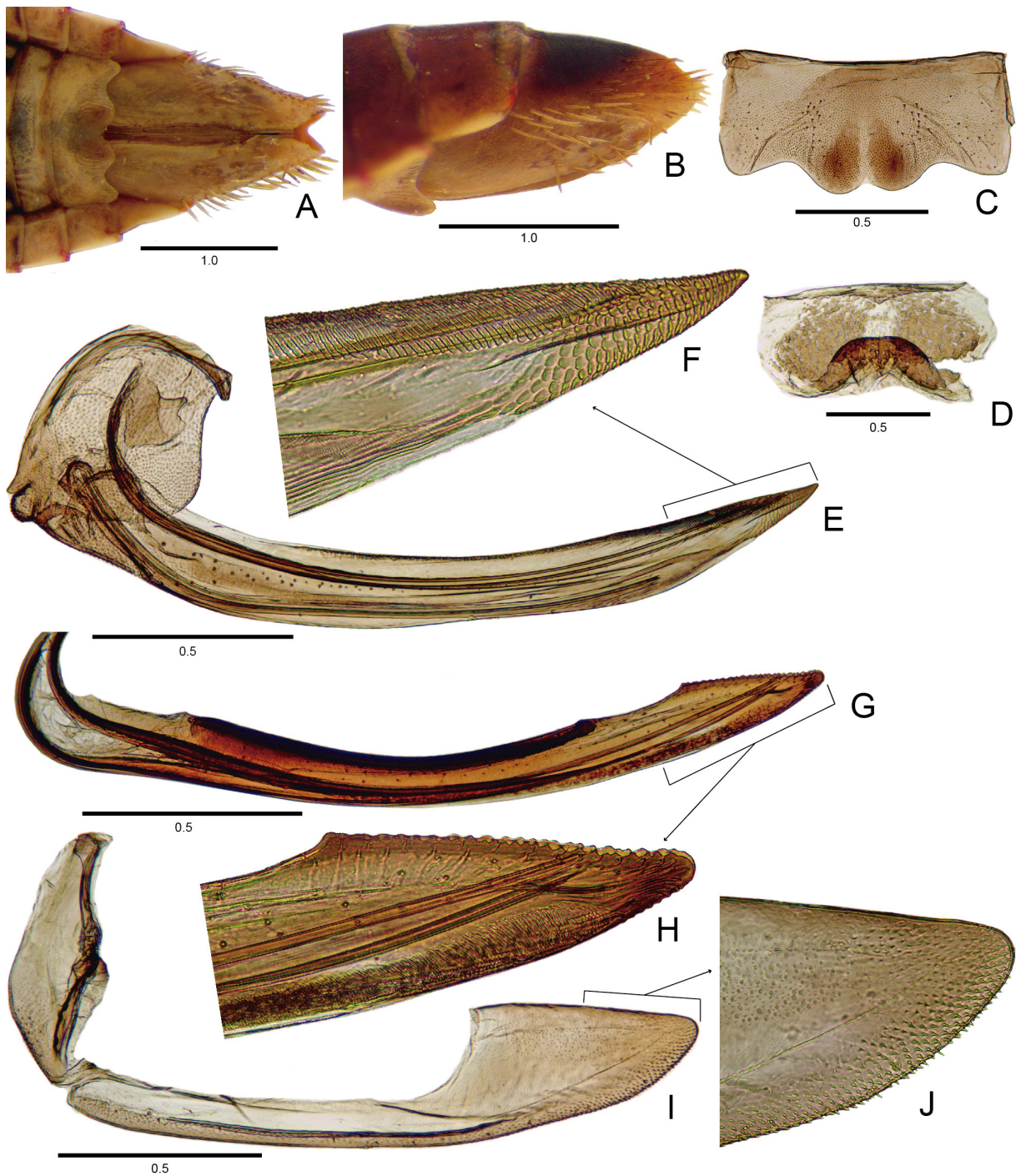
BRAZIL • **Santa Catarina** – 1 ♂, holotype of *Costanana cella*; “Brasilien \ Nova Teutonia \ 27°11’ S 52°23’ W \ 1939 \ Fritz Plaumann”; NCSU. – **Paraná** (new record) • 64 ♂♂, 20 ♀♀; São José dos Pinhais; 25°36’18” S, 49°11’37” W; DZUP • 1 ♀; Palmas; 26°29’ S, 51°39’ W; DZUP • 1 ♂; Colombo; DZUP.

## Description

FEMALE TERMINALIA. Sternite VII (Fig. 16A, C), in ventral view, 2.4× as wide as long; posterolateral margins subtruncated, not produced posterad; weakly excavated laterad of narrow median lobe, which occupies less than median third and is produced posterad as far as lateral angles. Internal sternite VIII (Fig. 16D) with a small triangular portion sclerotized. Pygofer (Fig. 16A–B), in lateral view, approximately 2.5× as long as high; macrosetae distributed on posteroventral quadrant; apex rounded. First valvifer (Fig. 16E) subelliptic, slightly higher than wide, anterodorsal and posteroventral angles rounded. First valvula (Fig. 16E) 6× as long as high; slightly higher near base; ventral interlocking device long, almost reaching apical fourth; dorsal sculptured area strigate; apical portion (Fig. 16F) abruptly tapered; apex acute and areolate. Second valvula (Fig. 16G) 8.5× as long as high; dorsal protuberance minute and

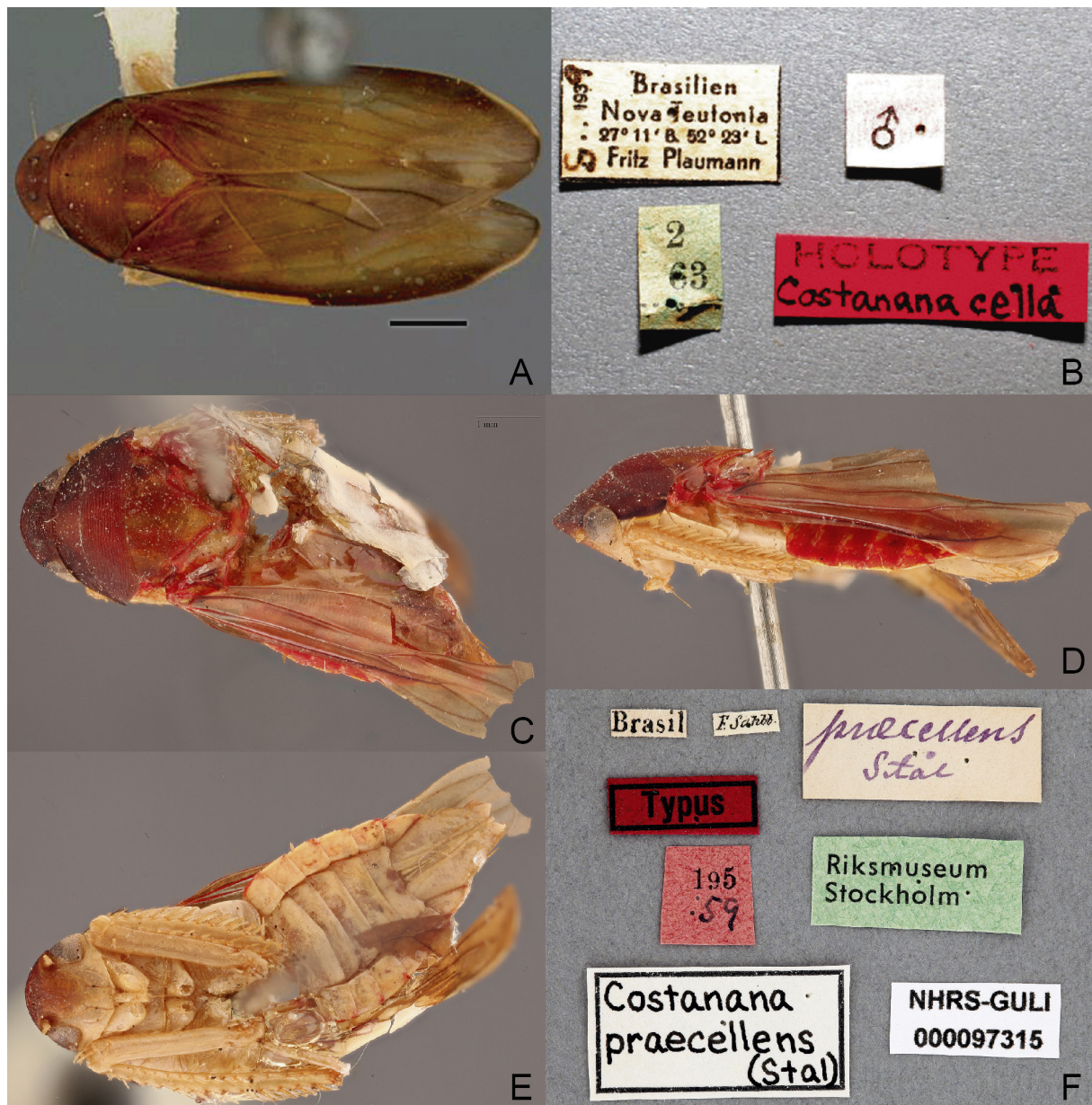


**Fig. 13.** Habitus of species of *Costanana* DeLong & Freytag, 1972. Left, dorsal view; right, lateral view. **A–B.** *C. flavina* DeLong & Freytag, 1972 (DZUP). **C–D.** *C. praecellens* (Stål, 1862) (DZUP). **E–F.** *C. santana* DeLong & Wolda, 1983 (DZUP). Scale bars in mm.



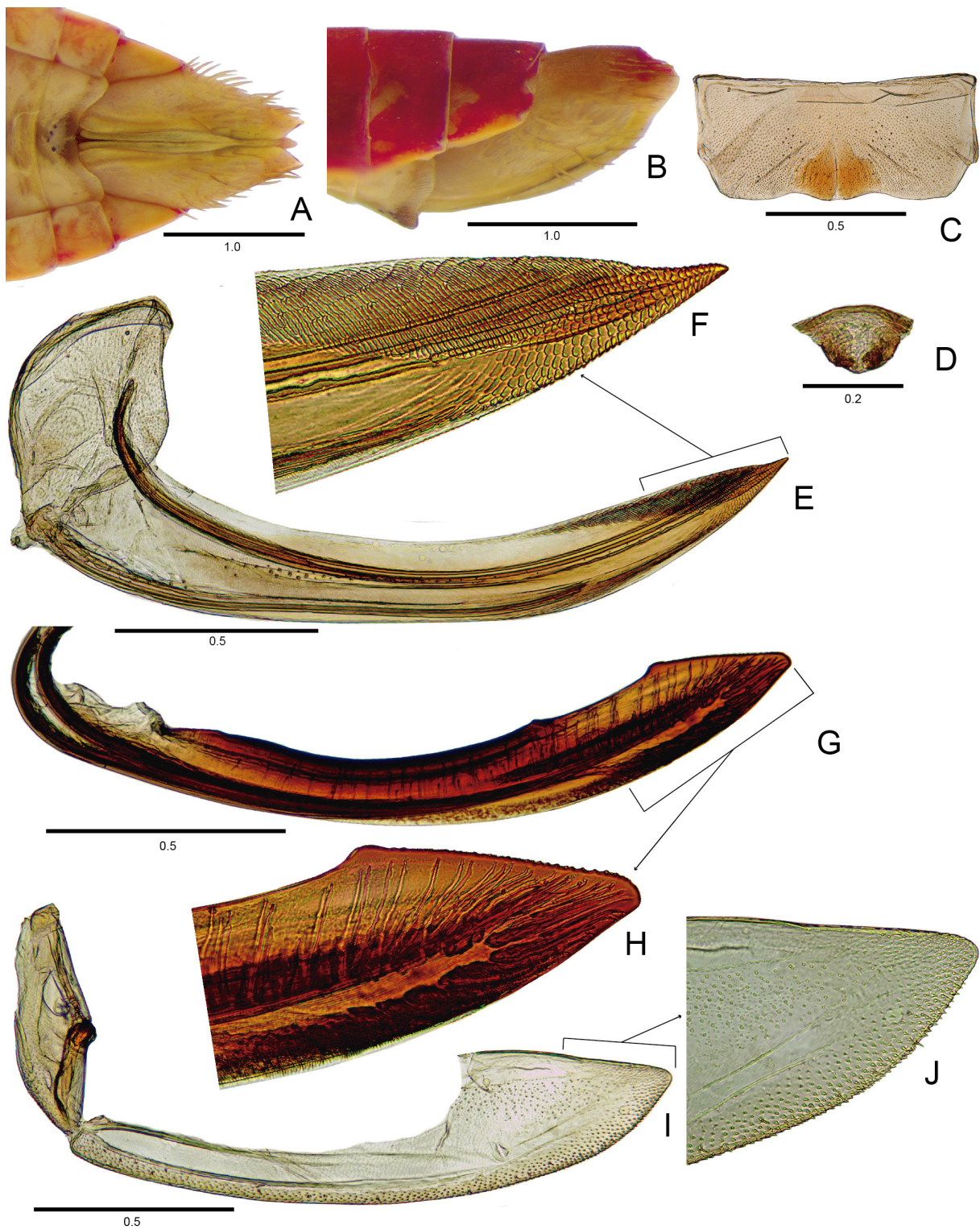
**Fig. 14.** *Costanana flavina* DeLong & Freytag, 1972, ♀ (DZUP). **A.** Apical portion of abdomen, ventral view. **B.** Apical portion of abdomen, lateral view. **C.** Sternite VII, ventral view. **D.** Internal sternite VIII, ventral view. **E.** First valvifer and first valvula, lateral view. **F.** Apical portion of first valvula. **G.** Second valvulae, lateral view. **H.** Apical portion of second valvulae. **I.** Second valvifer and gonoplac, lateral view. **J.** Apical portion of gonoplac. Scale bars in mm.

acute, localized before midlength of blade; apical portion (Fig. 16H) dorsal margin with a larger round tooth followed by minute denticles, approximately regular in shape and size and restricted to apical sixth; ventroapical margin without denticles; apex rounded. Second valvifer (Fig. 16I) approximately 2.8× as high as wide. Gonoplac (Fig. 16I) 4.5× as long as high; dorsoapical margin straight, with one-third of gonoplac length; ventral margin evenly rounded, with a few short setae; outer surface (Fig. 16J) with many integumentary denticles; rounded apex.

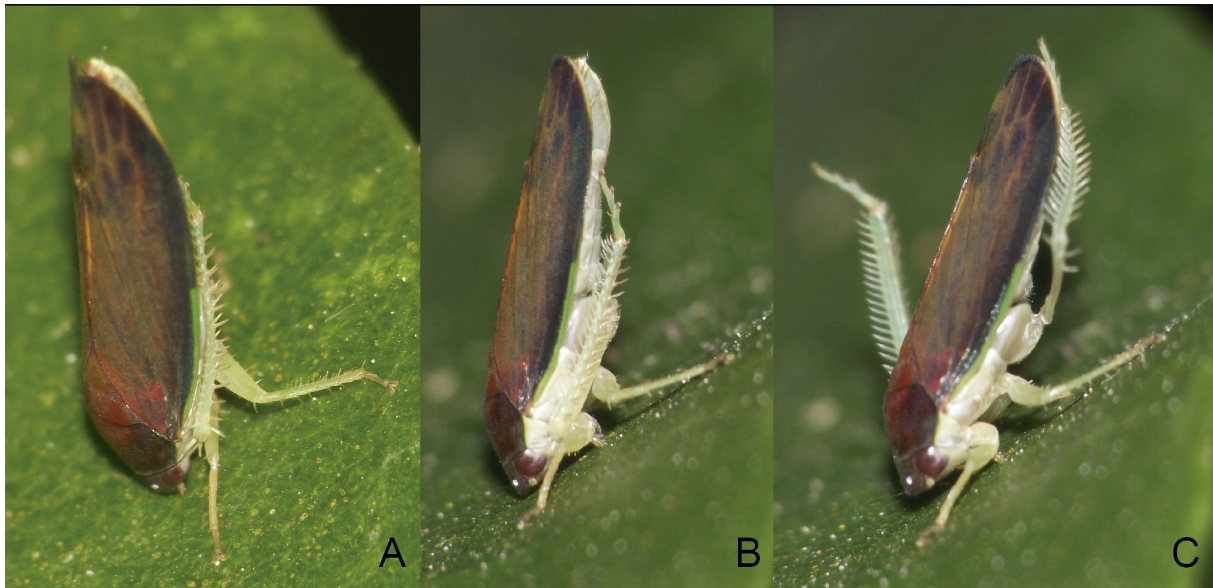


**Fig. 15.** *Costanana praecellens* (Stål, 1862). **A–B.** *C. cella* DeLong & Freytag, 1972 syn. nov., holotype, ♂ (NCSU 43172). **A.** Habitus, dorsal view. **B.** Labels. **C–F.** *C. praecellens*, holotype, ♀ (NHRS 97315). **C.** Habitus, dorsal view. **D.** Habitus, lateral view. **E.** Habitus, ventral view. **F.** Labels.





**Fig. 16.** *Costanana praezellens* (Stål, 1862), ♀ (DZUP). **A.** Apical portion of abdomen, ventral view. **B.** Apical portion of abdomen, lateral view. **C.** Sternite VII, ventral view. **D.** Internal sternite VIII, ventral view. **E.** First valvifer and first valvula, lateral view. **F.** Apical portion of first valvula. **G.** Second valvulae, lateral view. **H.** Apical portion of second valvulae. **I.** Second valvifer and gonoplac, lateral view. **J.** Apical portion of gonoplac. Scale bars in mm.



**Fig. 17.** Female of *Costanana praecellens* (Stål, 1862) feeding on a leaf in a curious upside down position. A–C. Same specimen at different view angles. C. Grooming behavior.

#### Behavior note

In a locality of the municipality of São José dos Pinhais (Paraná State, Brazil, 25°36'18" S, 49°11'37" W) *C. praecellens* and *C. flavina* are abundant species among the approximately 55 species of Gyponini found there. Both species are apparently polyphagous, feeding on shrubs and trees at a fragment of Araucaria moist forest. Both species were found presenting a feeding behavior in a curious upside down position, but we were able to record images only for a female specimen of *C. praecellens* (Fig. 17). The pro- and mesothoracic legs are extended, forming a cross, while the frons almost touches the leaf surface and the abdomen and metathoracic legs are directed almost vertically (Fig. 17A–B). In the figures 17B and C it is possible to observe the mouthparts inserted on the leaf parenchyma. We observed the specimen in this position for an interval of approximately 10 minutes in which the leafhopper also showed grooming behavior (Fig. 17C), but without releases of drops of excreta or brochosome fluid from the anus. We have never observed this type of behavior in species of the other Gyponini genera and perhaps this is characteristic of *Costanana*.

#### Remarks

*Gypona praecellens* Stål, 1862 was described based on a single female specimen labeled as “Brasil” (Fig. 15C–F). DeLong and Freytag (1972b) examined an additional female specimen from Santa Catarina State (Southern Brazil) deposited at NHRS and transferred this species to *Costanana*. In the same work, the authors described *Costanana cella* based on a single male specimen from Santa Catarina State (Fig. 15A–B) and commented that this specimen probably is a male of *C. praecellens*. We examined 65 pinned males and 21 females from Paraná State (Southern Brazil) (Figs 13C–D, 16–17), that fit perfectly with the descriptions of these species and therefore we propose that *C. cella* is a junior synonym of *C. praecellens*.

*Costanana santana* DeLong & Wolda, 1983  
Fig. 13E–F

*Costanana santana* DeLong & Wolda, 1983: 467.

**Material examined**

BRAZIL – Pernambuco (new record) • 2 ♂♂; Caruaru; DZUP.

**Remarks**

*Costanana santana* was described from Santa Isabel, Pará State (Northern Brazil), here recorded for the first time in the Northeast region of Brazil.

*Costanana helvacosta* DeLong & Freytag, 1972

Fig. 18

*Costanana helvacosta* DeLong & Freytag, 1972b: 496.

**Material examined**

**Holotype**

COLOMBIA • ♂; “Minca \ Colombia \ Acc. No. 1999”, “May \ 1898”, “CMNH-IZ \ 724,310”; CMNH 724310.



**Fig. 18.** *Costanana helvacosta* DeLong & Freytag, 1972, holotype, ♂ (CMNH 724,310). A. Habitus, dorsal view. B. Habitus, lateral view. C. Habitus, ventral view. D. Labels.

## Remarks

*Costanana helvacosta* closely resembles *C. nana*, *C. santana* and *C. rubromarginata* sp. nov. and was described based on a single male from Colombia.

*Costanana nupera* (Van Duzee, 1907) comb. nov.

Fig. 19

*Gypona nupera* Van Duzee, 1907: 61.

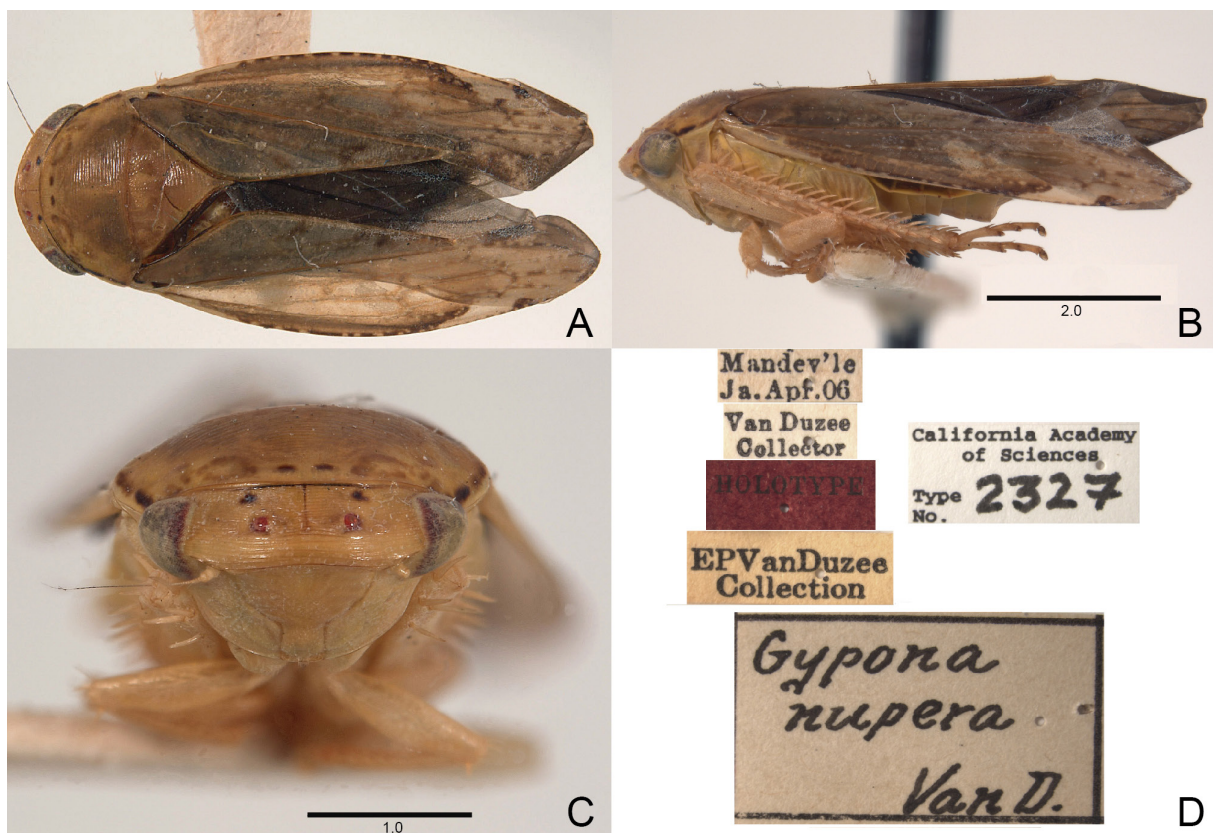
## Material examined

### Holotype

JAMAICA • ♀; “Mandev’le \ Ja. Apr. 06”, “Van Duzee \ Collector”, “California Academy \ of Sciences \ Type N°. 2327”; CAS 2327.

## Remarks

This species is known based on a single female specimen from Jamaica (Fig. 19A–D) and was one of the 16 species not studied in the revision of the genus *Gypona* (DeLong & Freytag 1964). The external morphology and general coloration of *Gypona nupera* is very similar to that of *Costanana cifi* sp. nov. (Fig. 11E–F) – see remarks on this species – and because of that we decided to transfer this species to *Costanana*.



**Fig. 19.** *Costanana nupera* (Van Duzee, 1907) comb. nov., holotype, ♀ (CAS 2327). A. Habitus, dorsal view. B. Habitus, lateral view. C. Habitus, ventral view. D. Labels.

Genus *Acuponana* DeLong & Freytag, 1970

*Acuponana minuta* (Spångberg, 1878) comb. nov.

Fig. 20

*Gypona minuta* Spångberg, 1878: 37.

*Costanana minuta* – DeLong & Freytag 1972b: 499.

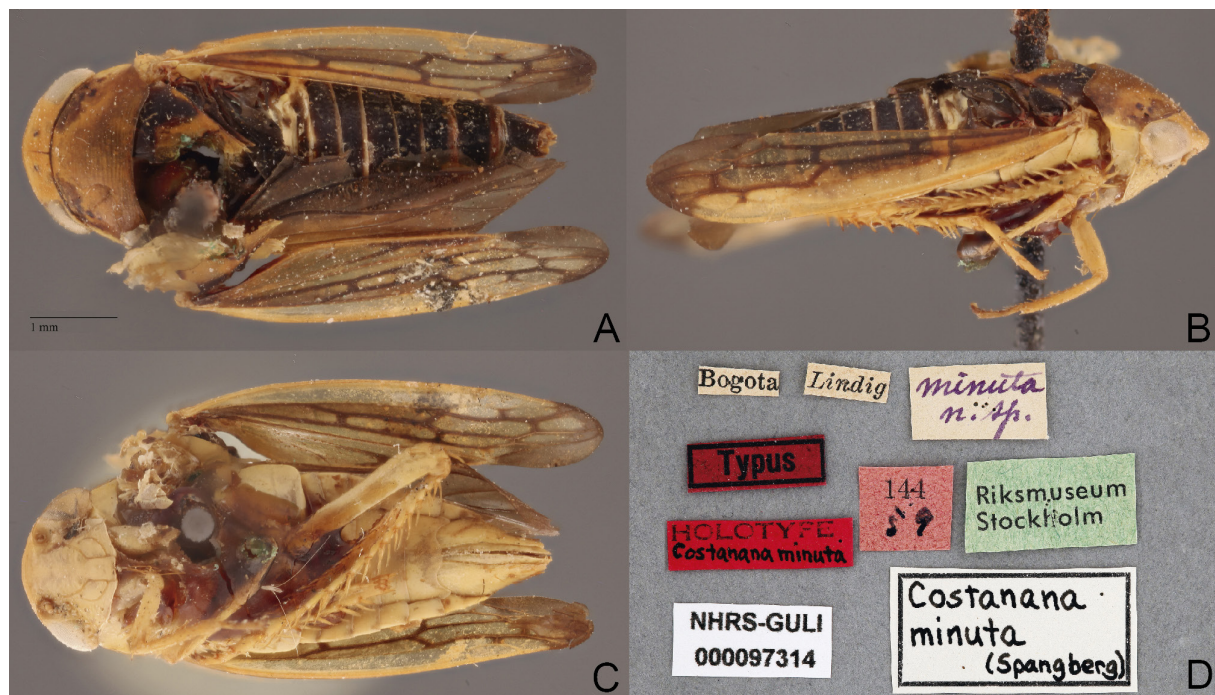
### Material examined

#### Holotype

COLOMBIA • ♀; “Bogota”, “Lindig”, “NHRS-GULI \ 000097314”; NHRS 97314.

### Remarks

This species is only known based on a female specimen from Colombia (Fig. 20A–D). The coloration of the forewing differs from all the other species of *Costanana* by the entire length of the costal margin being yellow and the veins black, strongly contrasting with the translucent yellowish membrane. The crown with transverse striae, the anterior margin moderately thick and the alar appendix well developed are similar features to those of species of *Costanana*. We have in our possession four undescribed new species from the states of Amazonas, Mato Grosso and Pará, Brazil, with exactly the same color pattern on the forewings but that differ from *C. minuta* in the coloration of the pronotum, having two or three pairs of well defined round black spots. The male genitalia of these new species are most similar to those of *Acuponana* DeLong & Freytag, 1970 or *Marganana (Declivana)* DeLong & Freytag, 1963 in having the male sternite VIII short, the subgenital plates exposed, without filiform setae, the male pygofer with short process on the dorsoapical margin and the few macrosetae grouped near the apex, similar to *A. consesa* DeLong & Freytag, 1970, *A. fera* DeLong & Freytag, 1970 and *A. enera* DeLong & Freytag,



**Fig. 20.** *Acuponana minuta* (Spångberg, 1878) comb. nov., holotype, ♀ (NHRS 97314). **A.** Habitus, dorsal view. **B.** Habitus, lateral view. **C.** Habitus, ventral view. **D.** Labels.

1970, and the connective T-shaped. In our understanding, these species must belong to *Acuponana* and, by comparison of the external morphology and general coloration, this also applies to *Costanana minuta*.

Genus *Gypona* Germar, 1821

*Gypona viridans* DeLong & Martinson, 1972  
Fig. 21

*Gypona viridans* DeLong & Martinson, 1972: 168.  
*Costanana asymmetrica* DeLong & Freytag, 1972b: 497. **Syn. nov.**

#### Material examined

##### Holotype

BRAZIL • ♂; “Brasilien \ Nova Teutonia \ 27°11’S 52°23’W \ 19-7-1948 \ Fritz Plaumann”; MZSP.

##### Other material

BRAZIL – **Rio de Janeiro** • 1 ♂, holotype of *Costanana asymmetrica*; “Schott \ Brasilien”; NHMW. – **Minas Gerais** (new record) • 1 ♂; Parque Nacional da Serra do Cipó; 19°20’35” S, 43°37’08” W; DZUP • 1 ♂; Itamarandiba; DZUP.

#### Remarks

DeLong & Martinson (1972) described *Gypona viridans* based on a single male specimen from Santa Catarina State, Southern Brazil (Fig. 21A–B). The holotype of *Costanana asymmetrica* was collected by Heinrich Wilhelm Schott, Austrian botanist taxonomist of Araceae Juss., who spent four years in Brazil (1817–1821) studying the flora in locations in Rio de Janeiro State such as Cabo Frio, Rio Paraíba, Rio Paraibuna, Cantagalo and Cachoeira de Macacu. This species was described by DeLong & Freytag (1972b) based on this single male specimen (Fig. 21C–E) that strongly contrasts the other species of *Costanana* in having the coloration uniformly yellow, the crown surface with oblique-rugose striae (like in figure 25D), and the alar appendix undeveloped. We also studied two male specimens from Minas Gerais State, Brazil (Fig. 21F–G). Curiously, one of the specimens has the branched process at the left side of the aedeagus as in *G. viridans* and the other at the right side as in *C. asymmetrica*. After comparing these two specimens with the illustrations and descriptions of *G. viridans* and *C. asymmetrica*, we concluded that there are no differences that can separate these two species and therefore they should be considered as synonyms.

*Gypona costata* (DeLong & Freytag, 1972) comb. nov.  
Fig. 22

*Costanana costata* DeLong & Freytag, 1972b: 498.

#### Material examined

##### Holotype

BRAZIL • ♂; “Rio de Janeiro”, “Collection \ CF Baker”, “USNMENT \ 01513809”; USNM 1513809.

##### Other material

BRAZIL – **Pernambuco** (new record) • 1 ♂; Caruaru; DZUP.

#### Remarks

This species was described based on a single male from Rio de Janeiro State, Brazil (Fig. 22A–D). We studied an additional male specimen from Pernambuco State (Fig. 22E–F) that leaves no doubt that this species should be transferred to *Gypona* because of its having the crown with oblique striations between the ocelli (Fig. 25C) and the genitalia and coloration similar to those of several species of *Gypona*.



**Fig. 21.** *Gypona viridans* DeLong & Martinson, 1972. **A–B.** Holotype, ♂ (MZSP). **A.** Habitus, dorsolateral view. **B.** Labels. **C–E.** *Costanana asymmetrica* DeLong & Freytag, 1972 syn. nov., holotype, ♂ (NHMW). **C.** Habitus, dorsal view. **D.** Habitus, lateral view. **E.** Labels. **F–G.** Specimen, ♂ (DZUP). **F.** Habitus, dorsal view. **G.** Habitus, lateral view. Scale bars in mm.



**Fig. 22.** *Gypona costata* (DeLong & Freytag, 1972) comb. nov. **A–D.** Holotype, ♂ (USNM 01513809). **A.** Habitus, dorsal view. **B.** Habitus, lateral view. **C.** Head, ventral view. **D.** Labels. **E–F.** Specimen, ♂ (DZUP). **E.** Habitus, dorsal view. **F.** Habitus, lateral view. Scale bars in mm.

*Gypona flavicosta* Stål, 1862 comb. nov.

Figs 23–24

*Gypona flavicosta* Stål, 1862: 46.

*Costanana flavicosta* – DeLong & Freytag 1972b: 498.

**Material examined**

**Holotype**

BRAZIL • ♂; “Rio Jan”, “F. Sahlb”, “NHRS-GULI \ 000097313”; NHRS 97313.

**Other material**

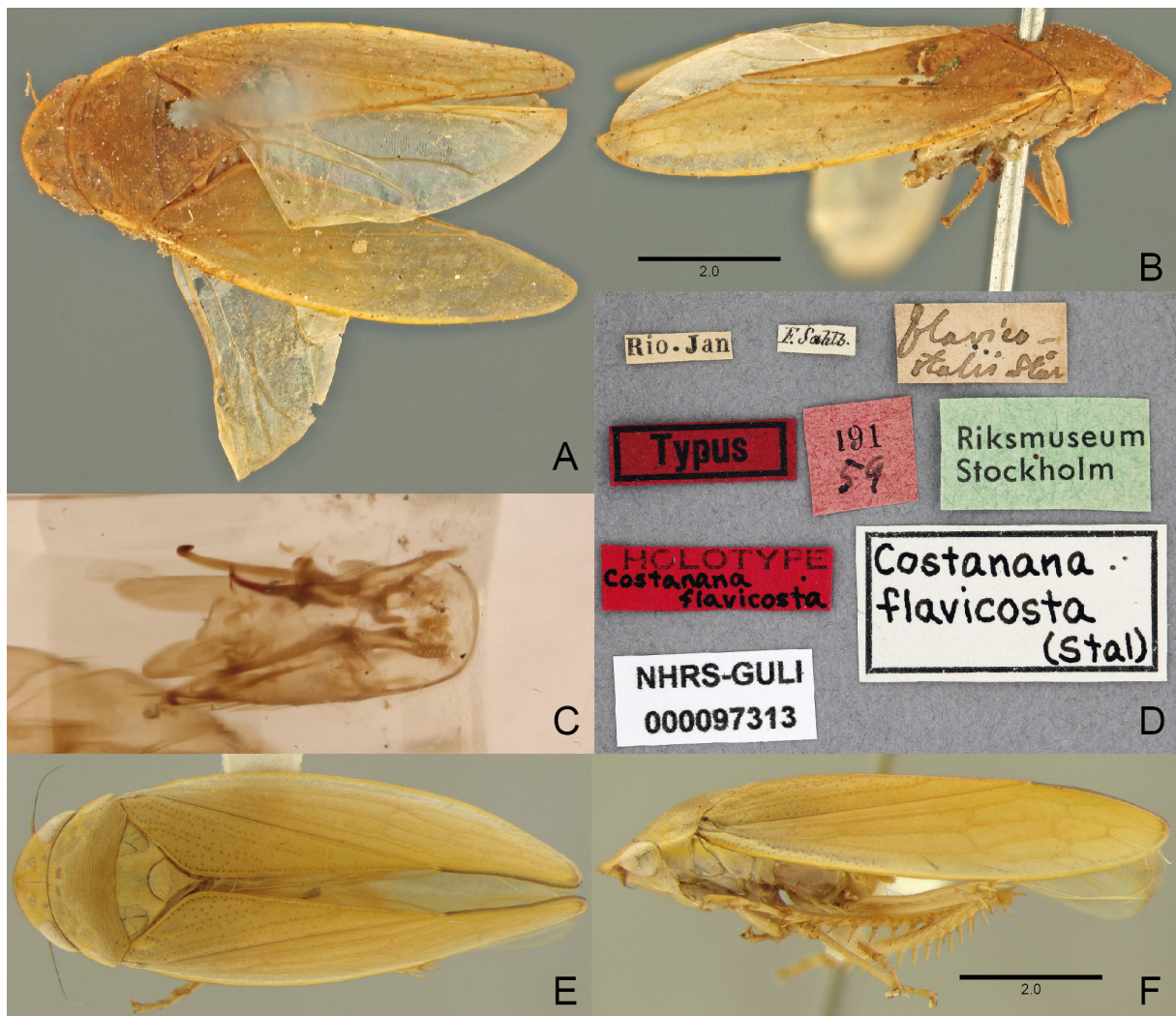
BRAZIL – Paraná (new record) • 2 ♂♂, 1 ♀; Antonina, RPPN Guaricica, 25.316° S, 46.696° W; DZUP.

– Espírito Santo (new record) • 2 ♂♂, 1 ♀; Domingos Martins; 20°22'17.3" S, 41°03'47.7" W; DZUP.



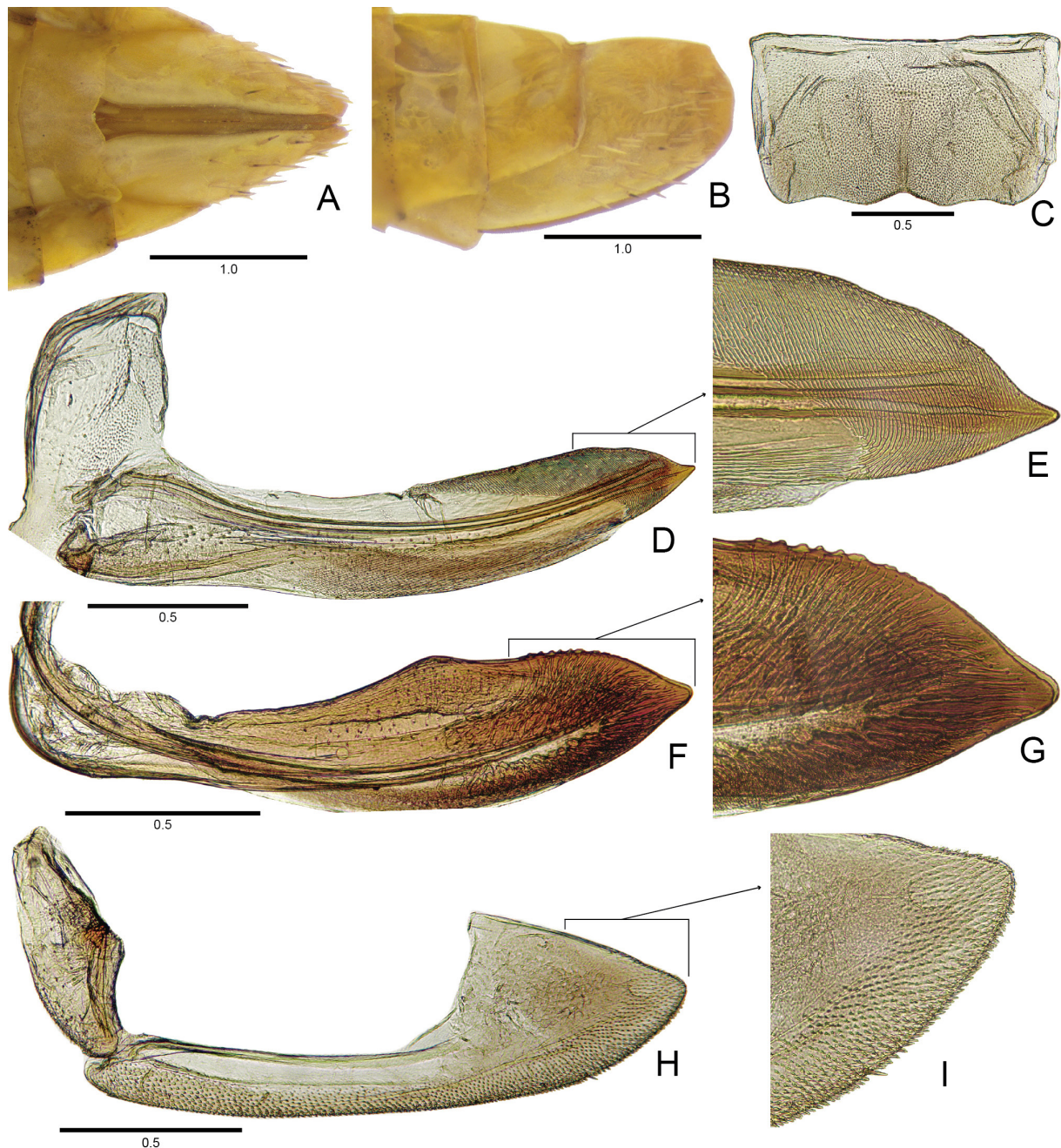
**Description**

FEMALE TERMINALIA. Sternite VII (Fig. 24A, C), in ventral view, 2× as wide as long; posterolateral margins rounded, not produced posterad; posterior margin weakly V-shaped, notched medially and shallowly excavated on each side of middle portion. Internal sternite VIII membranous. Pygofer (Fig. 24A–B), in lateral view, 2× as long as high; macrosetae distributed on posteroventral quadrant; apex rounded. First valvifer (Fig. 24D) trapezoid, 1.5× as high as wide, fused to each other by an extension of anteroventral angle; anterodorsal and posteroventral angles rounded. First valvula (Fig. 24D) 5.5× as long as high, moderately broad, dorsal and ventral margins parallel; ventral interlocking device short, restricted to basal third; dorsal sculptured area strigate, extending ventrally on apical portion; apical portion (Fig. 24E) abruptly tapered; apex acute. Second valvula (Fig. 24F) 4.3× as long as high; dorsal protuberance rounded, moderately developed, localized at nearly half-length of blade; apical portion (Fig. 24G) dorsal margin with a few rounded denticles subapically; ventroapical margin without denticles; apex subacute. Second valvifer (Fig. 24H) approximately 2.6× as high as wide. Gonoplac (Fig. 24H) 3.2× as long as high; dorsoapical margin straight and oblique, one-third of gonoplac length; ventral margin evenly

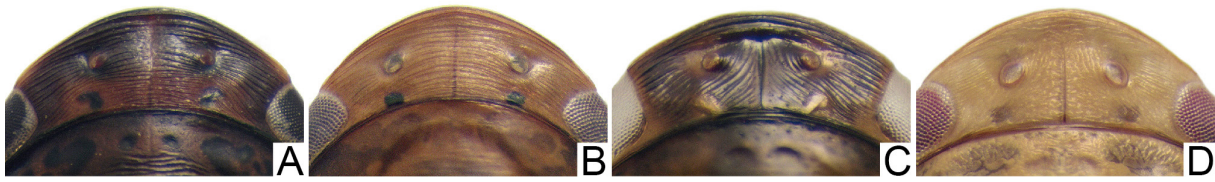


**Fig. 23.** *Gypona flavicosta* Stål, 1862 comb. nov. A–D. Holotype, ♂ (NHRSG 97313). A. Habitus, dorsal view. B. Habitus, lateral view. C. Male genitalia. D. Labels. E–F. Specimen, ♂ (DZUP). E. Habitus, dorsal view. F. Habitus, lateral view.

rounded, with a few short setae; outer surface (Fig. 24I) with many integumentary denticles; rounded apex.



**Fig. 24.** *Gypona flavicosta* Stål, 1862 comb. nov., ♀ (DZUP). **A.** Apical portion of abdomen, ventral view. **B.** Apical 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 valvulae, lateral view. **G.** Apical portion of second valvulae. **H.** Second valvifer and gonoplac, lateral view. **I.** Apical portion of gonoplac. Scale bars in mm.



**Fig. 25.** Sculpturation of crown. **A.** *Costanana flavina* DeLong & Freytag, 1972, transverse striae. **B.** *Metacostana cornuta* gen. et sp. nov., transverse striae. **C.** *Gypona costata* (DeLong & Freytag, 1972) comb. nov., oblique striae. **D.** *Gypona flavicosta* Stål, 1862 comb. nov., oblique-rugose striae.

### Remarks

*Gypona flavicosta* is remarkably similar in coloration and external morphology to *C. asymmetrica* and was described based on a single male from Rio de Janeiro State, Brazil (Fig. 23A–D). DeLong & Freytag (1972b) transferred this species to *Costanana*. We studied four males and two females from the states of Paraná and Espírito Santo, Brazil.

The following characteristics of the female ovipositor are incongruent when compared to the other species of *Costanana*: (1) the first valvula wide (Fig. 24D); (2) the ventral interlocking device short (Fig. 24D); (3) the apex abruptly tapered (Fig. 24E); (4) the second valvula wider medially (Fig. 24F); (5) the dorsal protuberance rounded and most prominent (Fig. 24F); (6) the denticles located subapically (Fig. 24G). Furthermore, in addition to *G. asymmetrica* (junior synonym of *Gypona viridans*) we are suggest transferring *Costanana flavicosta* to *Gypona* because this species differs from other species of *Costanana* in the coloration being uniformly yellow (Fig. 23A, E), the crown surface having oblique-rugose striae (Fig. 25D), and the alar appendix being undeveloped (Fig. 23A, E).

### Key to males of *Costanana*

Except *Costanana nupera* only known for the female.

1. Aedeagus with pair of processes arising near base or midlength of shaft; distal portion without processes (Figs 1L–M, 9L–M) ..... 2
  - Aedeagus without processes near base and with apical or subapical processes (Fig. 7L–M) ..... 8
2. Aedeagus with processes at base or midlength not extending parallel to shaft to near apex (Fig. 1L–M) ..... 3
  - Aedeagus with long and slender processes at base or midlength of shaft, extending parallel to shaft to near apex (Fig. 9L–M) ..... 4
3. Style with apex truncated, forming a pair of acute processes, one directed dorsally and one ventrally (Fig. 1K). Aedeagus with pair of wing-shaped processes near base, shaft with slender basodorsal process and pair of minute spurs near midlength of ventral margin (Fig. 1L–M) .... *C. alata* sp. nov.
  - Style apical portion slender and sharp-pointed (DeLong & Freytag 1972b: 493, fig. 13). Aedeagus with pair of slender processes near midlength of shaft; apex with three spiniform processes (DeLong & Freytag 1972b: 493, figs 11–12) ..... *C. flavina* DeLong & Freytag, 1972
4. Subgenital plate without long filiform setae, apex broad and rounded (DeLong & Wolda 1983: 467, fig. 4) ..... *C. santana* DeLong & Wolda, 1983
  - Subgenital plate with long filiform setae, apex tapered, narrow ..... 5

5. Style bifid subapically (Fig. 2K). Aedeagus with shaft short and robust (Fig. 2L) ..... *C. bifida* sp. nov.  
 – Style long and slender, apical portion not bifid apically (Fig. 9K). Aedeagus with shaft long and slender (Fig. 9L–M) ..... 6
6. Head with anterior margin red (Fig. 9A–C). Aedeagus, in lateral view, with laterobasal pair of processes abruptly broadened at midlength (Fig. 9L) ..... *C. rubromarginata* sp. nov.  
 – Head with anterior margin brown (Fig. 18A–C). Aedeagus, in lateral view, with laterobasal pair of processes nearly uniformly narrow (DeLong & Freytag 1972b: 493, figs 2, 7) ..... 7
7. Aedeagus, in posterior view, with shaft uniform in width to blunt apex, not longer than laterobasal processes (DeLong & Freytag 1972b: 493, fig. 1) ..... *C. nana* (Fowler, 1903)  
 – Aedeagus, in posterior view, with shaft tapering to acute apex, longer than laterobasal processes (DeLong & Freytag 1972b: 493, fig. 6) ..... *C. helvacosta* DeLong & Freytag, 1972
8. Aedeagus with a single apical process curved ventrally (DeLong & Wolda 1983: 467, figs 10–11) ..... *C. apicata* DeLong & Wolda, 1983  
 – Aedeagus with more than one apical process ..... 9
9. Aedeagus with one pair of long apical or subapical processes ..... 10  
 – Aedeagus with more than one pair of processes, varying in length ..... 13
10. Style acute apically (Fig. 8K). Aedeagus with apical pair of processes simple, without spurs near base (Fig. 8L) ..... 11  
 – Style truncated apically (Fig. 7K). Aedeagus with apical pair of processes with spurs near base (Fig. 7M) ..... *C. obtusa* sp. nov.
11. Style lacking subapical process on ventral margin (Fig. 8K). Aedeagus with apical or subapical processes directed basally (Fig. 8L) ..... 12  
 – Style with a short subapical process on ventral margin (Fig. 4K). Aedeagus with subapical processes directed dorsally and curved anterad (Fig. 4L) ..... *C. cifi* sp. nov.
12. Pygofer rounded apically, with dorsoapical process (DeLong & Freytag 1972b: 494, fig. 40). Style ventral margin serrated, slightly concave; apical portion bent dorsally at apical third (DeLong & Freytag 1972b: 494, fig. 37) ..... *C. dunda* DeLong & Freytag, 1972  
 – Pygofer truncate apically, without apical processes (Fig. 8G). Style ventral margin not serrated, with a dentiform process near base of blade; apical portion not bending dorsally (Fig. 8K) ..... *C. piraquarensis* sp. nov.
13. Subgenital plate tapered apically (Fig. 6H). Aedeagus shaft compressed, with a pair of long subapical processes directed basally, branched near base and a pair of short apical processes directed dorsally (Fig. 6L–M) ..... 14  
 – Subgenital plate rounded apically (Fig. 10H). Aedeagus shaft cylindrical, with two or more pairs of long processes (Fig. 10L–M) ..... 15
14. Style dorsal margin with wide dentiform process near midlength (Fig. 6K). Aedeagus branched subapical processes with ventral ramus half as long as dorsal ramus (Fig. 6L) ..... *C. luzi* sp. nov.  
 – Style dorsal margin without process near midlength (DeLong & Freytag 1972b: 494, fig. 23). Aedeagus branched subapical processes with rami about equal in length (DeLong & Freytag 1972b: 494, figs 21–22) ..... *C. praecellens* (Stål, 1862)

15. Aedeagus with two pairs of apical processes equal in length (DeLong & Wolda 1983: 467, fig. 6)  
..... *C. circumaga* DeLong & Wolda, 1983  
– Aedeagus with four pairs of apical and subapical processes varying in length (Fig. 10M) .....  
..... *C. xenomorpha* sp. nov.

Genus *Metacostana* gen. nov.

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### Type species

*Metacostana cornuta* gen. et sp. nov.

### Diagnosis

Head (Fig. 26A), in dorsal view, median length of crown less than half interocular width; crown surface with fine parallel transverse striations (Fig. 25B); ocelli equidistant between median line and eyes; in lateral view (Fig. 26C), crown-face transition thin, with three transverse carinae. Forewing (Fig. 26D) without extra crossveins. Metatibia row AD with intercalary setae between macrosetae. Male sternite VIII (Fig. 26E) long, fully hiding subgenital plates in repose. Male pygofer (Fig. 26G) with ventroposterior process. Subgenital plate (Fig. 24H) bearing filiform setae. Aedeagus (Fig. 26L–M) with apodemal processes. Female first and second valvulae of ovipositor (Fig. 27D, F) not broadened medially and curved ventrally. Second valvula (Fig. 27F) with weakly developed dorsal protuberance; dorsal margin (Fig. 27F) with prominent regular teeth on apical third.

### Etymology

The new genus name is feminine and combines the prefix ‘meta’ (‘different’) + part of the name *Costanana*, a closely related genus of Gyponini.

### Description

STRUCTURE. Head in dorsal view (Fig. 26A): slightly produced anteriorly, median length of crown less than half interocular width; crown surface with fine parallel transverse striations; anterior margin broadly rounded and parallel to anterior margin of pronotum, slightly extending over eye margin; transocular width of head narrower than humeral width of pronotum; ocelli equidistant between median line and eyes and slightly closer to anterior than posterior margin of crown; in frontal view (Fig. 26B), frons longer than wide, flat, not excavated below anterior margin of crown and with a few thin striations, texture shagreen; frontogenal suture distant from eye margins by maximum width of clypeus, not surpassing antennal ledge; antennal ledge carinated, obliquely downwards in relation to frons and extending over frons by short distance; epistomal suture indistinct medially; gena with ventrolateral margins slightly convex at midlength and weakly excavated near eye; maxillary plate produced ventrally as far as clypeus apex; clypeus not inflated, ca 1.5× as long as wide, lateral margins weakly divergent apically, apex emarginated; in lateral view (Fig. 26C), crown-face transition thin, with three transverse carinae. Pronotum in dorsal view (Fig. 26A): transversely striated except near anterior margin; lateral margins convergent anterad; in lateral view (Fig. 26C), moderately declivous; head and pronotum in continuous slope. Scutellum (Fig. 26C), not inflated. Forewing (Fig. 26A) without extra crossveins; venation distinct; M vein with segment after divergence between R+M and before cross vein m-cu<sub>1</sub>, as long as length of m-cu<sub>1</sub>; outer antepical cell short, almost half length of central and inner antepical cells; five apical cells (R1 vein present); appendix well developed and involving first and second apical cells; apex slightly tapered. Profemur elongated, approximately 3.5× as long as wide; AD, AM, and PD rows reduced and poorly defined, with exception of apical setae AD<sub>1</sub>, AM<sub>1</sub> and PD<sub>1</sub> respectively; AV row with 3 short setae; PV row with only an apical seta present. Protibia, in cross-section, more or less cylindrical, with longitudinal carina adjacent to PD row weakly developed; AV row formed

by long setae, gradually increasing in thickness and length towards apex; AD formed by many small undifferentiated setae; PD row with 3 long setae and intercalary undifferentiated setae; dorsal surface with apical setae AD<sub>1</sub> and PD<sub>1</sub> developed; PV row with 4 setae. Metafemur with setal formula 2:2:1. Metatibia rows PD, AD, and AV with 22–23, 12–13, and 14–15 macrosetae, respectively; AD row with intercalary setae between macrosetae; PV row with setae of apical half formed by sequence of 1 thicker and 3–4 thinner setae, ending with a thick seta. Metatarsomere I inner row of plantar surface with 5–6 setae, outer row very reduced in size; apex with 3 patellae flanked by 1 tapered lateral seta on inner and 1 on external corner. Metatarsomere II pecten with 2 patellae flanked by 2 tapered lateral setae on inner and 1 on external corner.

**MALE TERMINALIA.** Male sternite VIII (Fig. 26E) long, fully hiding subgenital plates. Male pygofer (Fig. 26G) with ventroposterior process. Subgenital plate (Fig. 26H) not more membranous apically than basally, with filiform setae on ventral surface and outer margin. Connective (Fig. 26I) linear. Aedeagus (Fig. 26L–M) with apodemal processes.

**FEMALE TERMINALIA.** First and second valvulae of ovipositor (Fig. 27D, G) not broadened medially and curved ventrally. First valvula (Fig. 27D) with ventral interlocking device long, reaching the apical fourth. Second valvula (Fig. 27G) with weakly developed dorsal protuberance; dorsal margin (Fig. 27G) with prominent regular teeth on apical third.

### **Distribution**

Southern Brazil.

### **Remarks**

The crown of *Metacostana cornuta* gen. et sp. nov. transversely striated and the anterior margin defined are features present in the genera *Acuthana*, *Costanana*, *Domahovana*, *Dumorpha*, *DeLongiana* Domahovski *et al.*, 2020, *Nullana* DeLong, 1976, *Ponana* Ball, 1920, *Regalana* DeLong & Freytag, 1975, and some species of *Polana* DeLong, 1942. Among these genera, the presence of apodemal processes on the aedeagus is shared only with *Dumorpha*, *Ponana* and some subgenera of *Polana*, and the male sternite VIII being well produced posterad, often hiding the subgenital plates, is shared with *Acuthana*, *Costanana*, *Domahovana*, *Dumorpha* and some species of *Polana*. Probably the unusual ventrally curved shape of the ovipositor will place *Metacostana* gen. nov. as sister group of *Acuthana*, which was the only known genus of Gyponini with this feature. The new genus can be differentiated from *Acuthana* by the color, with black and yellow maculae (uniformly yellowish-brown in *Acuthana*), the absence of punctuations and reticulations on the forewings, the male pygofer with process on the ventroapical margin, the subgenital plate not tapered apically, the connective linear, the presence of apodemal processes on the aedeagus, the most strongly curved ovipositor, with smaller dorsal protuberance on the second valvulae, and the apex without denticles on the ventral margin. Unfortunately the ovipositor of females of *Dumorpha* is unknown, but the new genus can be separated by the color (pale yellow without black markings or only a few in *Dumorpha*); the ocelli smaller and equidistant between eye and midline (closer to the eye margin in *Dumorpha*), the presence of a process on the ventroapical margin of the male pygofer, the connective linear shape, and the atrial processes of the aedeagus being broader. Compared to *Costanana*, the new genus can be differentiated due to the metatibia row AD having intercalary setae between the macrosetae (also present in *Dumorpha*), the presence of apodemal processes on the aedeagus and the different morphology of the female ovipositor.

*Metacostana cornuta* gen. et sp. nov.

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Figs 26–28

**Diagnosis**

Pygofer (Fig. 26G), with robust process on ventroposterior margin, extending posterad and surpassing pygofer apex. Style (Fig. 26K), in lateral view, blade slender, evenly curved dorsally, with uniform height to near apex. Aedeagus (Fig. 26L–M) apodemal processes broad at base, curved dorsally, apex tapered, not surpassing apex of aedeagus; shaft with pair of short subapical processes extending laterally and abruptly curving anterad.

**Etymology**

The new species epithet comes from the Latin word ‘*cornutus*’ meaning ‘horned’. It alludes to the horn-shaped process of the male pygofer.

**Material examined**

**Holotype**

BRAZIL • ♂; “Brasil, PR [Paraná], Antonina, \ R.P.P.N. [Reserva Particular do Patrimônio Natural] Guaricica, 25.316°S 46.696°W \ 31.I-04.II.2022, Luz solo, \ Entomologia UFPR”; DZUP 215498.

**Paratypes**

BRAZIL – **Paraná** • 5 ♂♂, 3 ♀♀; same collection data as for holotype; DZUP 215499 to 215511 • 3 ♂♂; same collection data as for holotype; DZRJ • 1 ♂; same collection data as for holotype; MNRJ • 1 ♂; same collection data as for holotype; MZSP • 4 ♂♂, 1 ♀; same collection data as for holotype, except “23-27.I.2023”; DZUP 214298 to 214304 • 1 ♂, 1 ♀; same collection data as for holotype, except “23-27.I.2023”; DZRJ • 1 ♀; “Brasil, PR, Antonina, R.P.P.N. \ Guaricica, 25.318963°W, \ 48.653769°W, 100m, 23-27.I.2023, Malaise susp. [suspensa], Trilha dos \ Pinheiros, Entomologia - UFPR”; DZUP 214297 • 1 ♂; “Antonina - PR [Paraná] \ Reserva Sapitanduva \ Brasil 19.I.1988 \ Lev. [Levantamento] Ent. [Entomológico] PROFAUPAR \ Lâmpada”; DZUP 215512 • 1 ♀; “Morretes - PR [Paraná] Brasil \ (IAPAR) [Instituto Agrônômico do Paraná] \ 21.I.1985 \ C.I.I.F. [Centro de Identificação de Insetos Fitófagos] (Luminosa)”; DZUP 215513 • 1 ♀; same collection data as preceding, except “30.I.1985”; DZUP 215514.

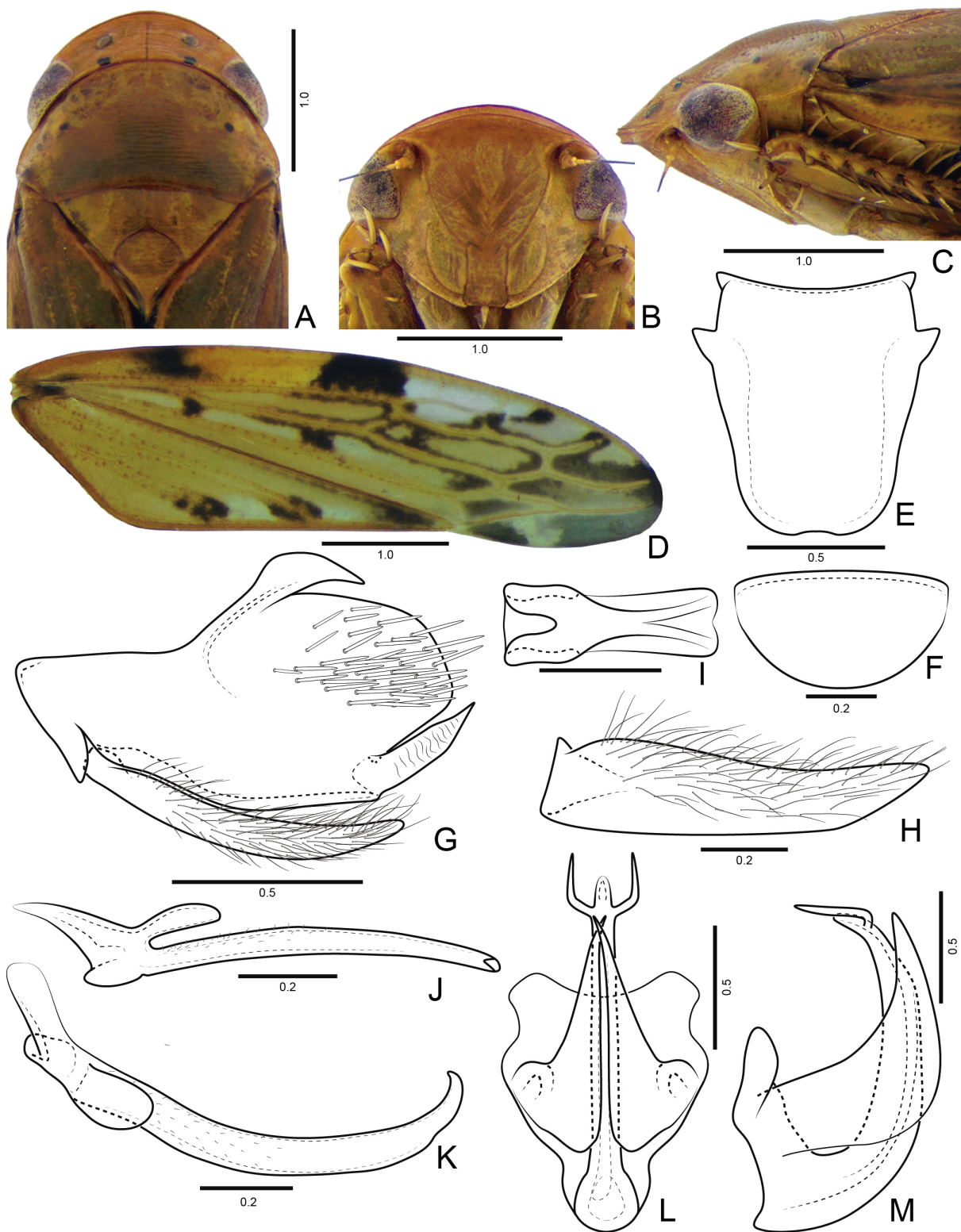
**Other material**

BRAZIL • 1 ♂, 1 ♀ (stored in ethanol); same collection data as for holotype; DZUP.

**Description**

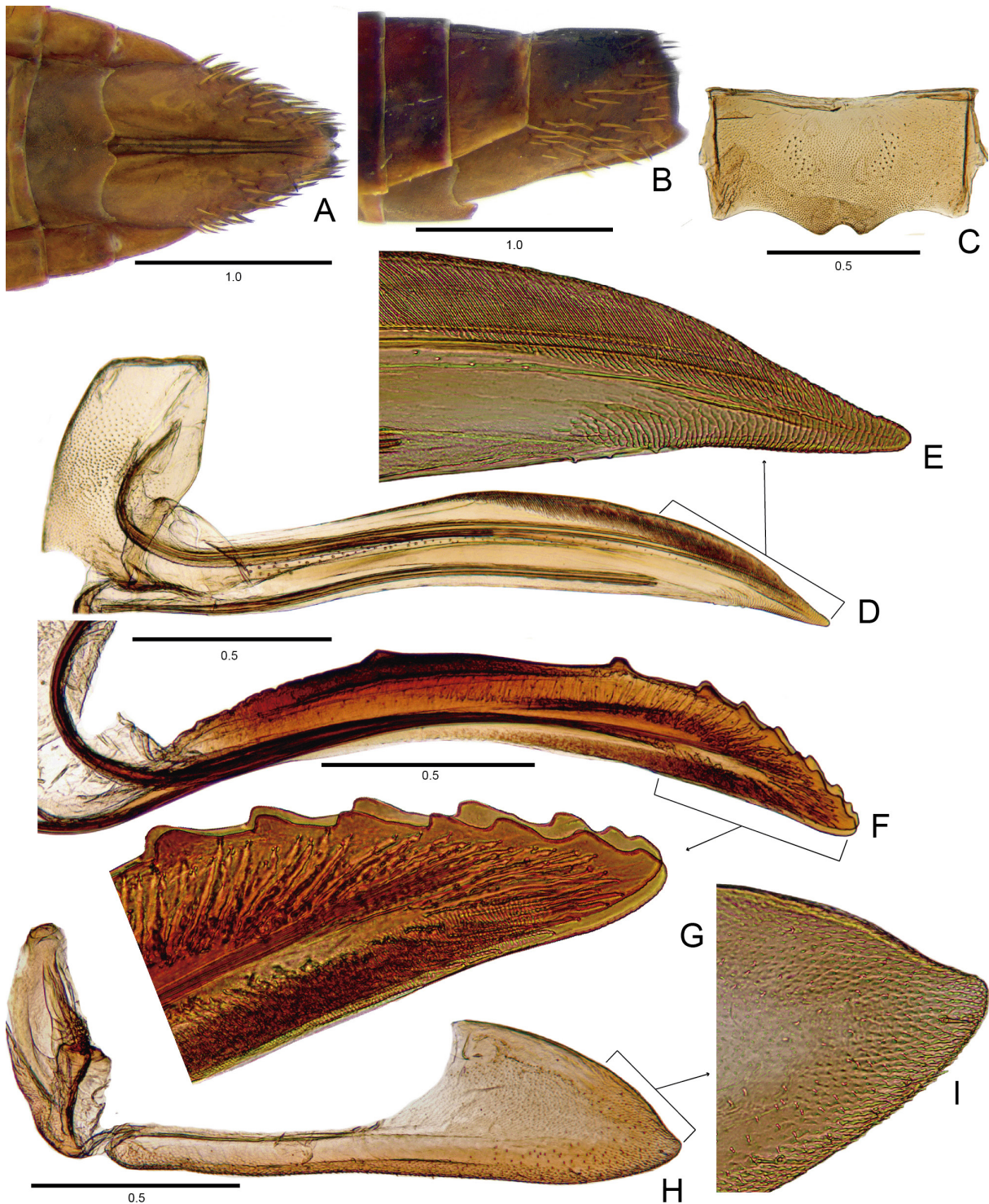
MEASUREMENTS. Holotype male: 6.3 mm. Paratypes: males (n = 16), 6.3–6.5 mm; females (n = 8), 7.0–7.1 mm.

COLORATION. Head and thorax (Figs 26A–C, 28) yellowish-brown. Crown (Fig. 26A) with pair of round black spots behind ocelli, near posterior margin; eyes and ocelli red. Pronotum (Fig. 26A) with pair of small round black spots behind eyes, near anterior margin. Face (Fig. 26B) without maculae. Proepimeron (Fig. 26C) without maculae. Forewing (Fig. 26D) costal margin with pair of black maculae near base and midlength, yellow macula between black maculae, and white macula at level of outer anteapical cell and third and fourth apical cells; veins outlined by black; cross veins of inner discal cell black; apex of anal veins, first to third apical cells and appendix smoky; appendix with whitish macula on basal third. Legs yellowish-brown with basal half of mesotibia black.



**Fig. 26.** *Metacostana cornuta* gen. et sp. nov., holotype, ♂ (DZUP 215498). **A.** Head and thorax, dorsal view. **B.** Head, ventral view. **C.** Head and thorax, lateral view. **D.** Forewing. **E–M.** Male terminalia. **E.** Sternite VIII, ventral view. **F.** Valve, anterior view. **G.** Pygofer, valve and subgenital plate, lateral view. **H.** Subgenital plate, ventral view. **I.** Connective, dorsal view. **J.** Style, dorsal view. **K.** Style, lateral view. **L.** Aedeagus, posterior view. **M.** Aedeagus, lateral view. Scale bars in mm.

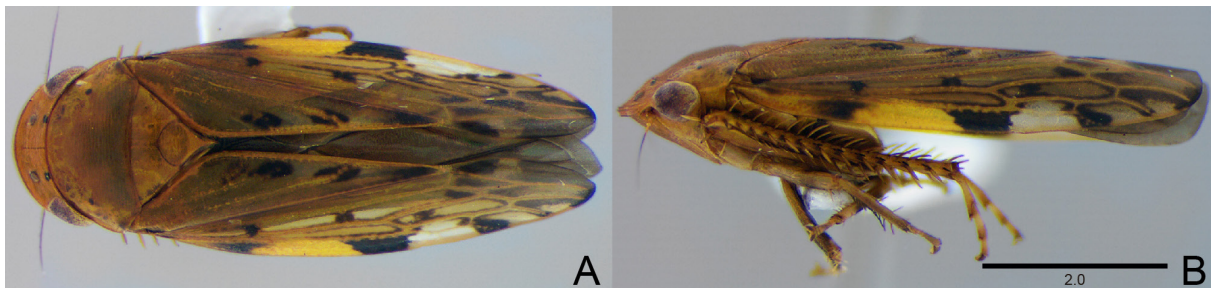




**Fig. 27.** *Metacostana cornuta* gen. et sp. nov., paratype, ♀ (DZUP 215513). **A.** Apical portion of abdomen, ventral view. **B.** Apical portion of abdomen, lateral view. **C.** Sternite VII, ventral view. **D.** First valvifer and first valvula, lateral view. **E.** Apical portion of first valvula. **F.** Second valvulae, lateral view. **G.** Apical portion of second valvulae. **H.** Second valvifer and gonoplac, lateral view. **I.** Apical portion of gonoplac. Scale bars in mm.

**MALE TERMINALIA.** Sternite VIII (Fig. 26E) 1.1× as long as wide; lateral margins with triangular projection near base; apex broad, truncated, and weakly emarginated. Valve (Fig. 26F) 1.8× as wide as long; integument thickening present only on anterior margin; posterior margin rounded. Pygofer (Fig. 26G), in lateral view, 1.7× as long as maximum height; basodorsal process absent; ventral margin broadly rounded; posterodorsal margin rounded; robust process on ventroposterior margin, extending posterad and surpassing pygofer apex, with transverse thin rugae, apex abruptly tapered and acute; macrosetae distributed on posterodorsal quadrant; apex subtruncated. Anal tube (segment X) membranous, without processes. Subgenital plate (Fig. 26G), in lateral view, not surpassing apex of pygofer; in ventral view (Fig. 26H), 4× as long as wide, wider near base than apically; inner margin straight; outer margin rounded near base; apex abruptly tapered, subacute, well sclerotized. Connective (Fig. 26I) linear-shaped; arms not produced laterally; stalk almost as wide as width of arms, long, 2× as long as maximum width of arms; median keel well developed. Style (Fig. 26J), in dorsal view, with outer lobe strongly developed, parallel to blade, rounded; in lateral view (Fig. 26K), blade slender, evenly curved dorsally, with uniform height to near apex; ventral margin not serrated; apex tapered and subacute. Aedeagus (Fig. 26L–M) preatrium not developed; dorsal apodeme produced dorsally but not laterally, dorsal margin excavated, dorsolateral corners rounded; apodemal processes broad at base, curved dorsally, apex tapered, not surpassing apex of aedeagus; shaft cylindrical, curved dorsally, gradually tapering to apex; apical portion with pair of short subapical processes extending laterally and abruptly curving anterad.

**FEMALE TERMINALIA.** Sternite VII (Fig. 27A–C) 1.8× as wide as long; posterior margin roundly excavated near lateral angles, median third produced and bearing V-shaped notch at middle. Sternite VIII membranous. Pygofer (Figs 27A–B) about 2× as long as maximum height; apex broad and truncated; macrosetae dispersed on posteroventral quadrant and apex of dorsal portion. First valvifer (Fig. 27D) 1.5× as high as long, anterior and dorsal margins straight, posterior margin weakly produced medially, surface with dentiform cuticular projections. First valvula (Fig. 27D) slightly curved ventrally, 7.3× as long as high; ventral interlocking device long, reaching apical fourth; dorsal sculptured area strigate; apical portion (Fig. 27E) gradually tapered toward acute apex, with striations continuous with dorsal sculptured area. Second valvula (Fig. 27F) distinctly curved ventrally, 9× as long as high; dorsal prominence small, located before half length of blade; apical portion (Fig. 27G) with eight teeth; ventral margin without teeth or denticles. Gonoploc (Fig. 27H) 3.8× as long as high; ventral margin straight; external surface with dentiform cuticular projections and short macrosetae near apex; dorsoapical margin slightly rounded; apex abruptly tapered and subacute.



**Fig. 28.** *Metacostana cornuta* gen. et sp. nov., holotype, ♂ (DZUP 215498). **A.** Habitus, dorsal view. **B.** Habitus, lateral view. Scale bar in mm.

## Discussion

Among the previously described species of *Costanana* we have not examined the holotypes of *C. apicata* and *C. circumaga* (OSUC), but based on the original descriptions and illustrations it is unlikely that these species belong to *Costanana*. The holotype of *Costanana nana* (BMNH) was also not studied, but this species closely resembles other species of *Costanana*. It would be interesting to carry out a phylogenetic study to test the monophyly of *Costanana* mainly due to the differences between the type species *C. dunda* in relation to most species of the genus, as for example, the different coloration (similar to *G. costata*), the valve deeply excavated medially, which is a characteristic feature not found in any other species of *Costanana* studied herein, but present in some species of *Acuponana*, and the male pygofer with a few macrosetae grouped near the apex, and having a dorsoapical process, similar to some species of *Acuponana* and *Gypona*. The shape and length of the male sternite VII represent diagnostic features for the generic recognition of *Costanana*, but they are unknown in *C. dunda*. We suspect that *C. dunda* may be a species of *Acuponana*, a poorly known genus that lacks strong diagnostic characters and need a taxonomic revision. As *Acuponana* is the oldest genus, then another species would have to be chosen as the type species under a new name for *Costanana*. Also, images of *C. apicata* and *C. circumaga* still need to be studied to determine the correct position for them.

With the taxonomic changes and new species described, *Costanana* now comprises 17 species with records in nine Brazilian States: Bahia, Mato Grosso, Minas Gerais, Pará, Paraná, Pernambuco, Rio Grande do Sul, Rio de Janeiro, Santa Catarina, and the Distrito Federal. Gyponini now comprises approximately 1471 species in 80 genera.

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