



Two new species of *Mendozellus* Linnavuori (Hemiptera: Cicadellidae: Deltocephalinae: Deltocephalini) with redescription of *Mendozellus asunctia* Cheng

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Abstract

Mendozellus paralaredanus sp. n. from Uruguay and *M. rakitovi* sp. n. from Peru are described. *M. asunctia* Cheng is redescribed, the ovipositor is illustrated for the first time, and newly recorded from Argentina. *M. serratus* DeLong is transferred to *Haldorus* Oman based on the male genitalia structure, creating the new combination *H. serratus* (DeLong), **comb. n.** A checklist and key to species of *Mendozellus* are provided.

Key words: Auchenorrhyncha, morphology, taxonomy, distribution, South America

Introduction

Linnavuori (1959) established *Mendozellus*, with the type species *Spathifer dubius* Linnavuori, as a subgenus of *Amplipcephalus* DeLong. Kramer (1971) elevated *Mendozellus* to genus level and Blocker, Fang & Black (1995) redescribed the genus in a review of Nearctic *Deltocephalus*-like leafhoppers. Until now, this genus comprised fifteen species distributed from the southwestern USA to Chile. In the present paper, two new species are described, *M. asunctia* Cheng is redescribed and its ovipositor illustrated for the first time, the new combination *Haldorus serratus* (DeLong), **comb. n.** is created, and a checklist and key to species of *Mendozellus* genus are provided.

Material and methods

The material studied here is deposited in the Illinois Natural History Survey (INHS) and Universidad de San Marcos Lima (USML). Morphological terminology follows Dietrich (2005). Digital photographs were taken with a QImaging Micropublisher 3.3 digital camera mounted on an Olympus BX41 stereo microscope and with a Nikon D1x digital SLR camera configured with lenses by the Microptics, Digital Lab XLT system. Photographs were modified with Adobe Photoshop CS.

Taxonomy

Mendozellus Linnavuori

Mendozellus Linnavuori, 1959: 117. Type: *Spathifer dubius* Linnavuori, 1955 (subgenus of *Amplipcephalus*).

Mendozellus Kramer, 1971: 261 (new status); Blocker, Fang & Black, 1995: 308–309.

Diagnosis. Vertex, pronotum, mesonotum and scutellum usually with wide medial pale longitudinal stripe extending onto inner margin of clavus. Apophysis of style usually robust or long. Aedeagal shaft usually with pair of ventrolateral teeth at or near apex, dorsal surface of shaft often poorly sclerotized; gonopore usually large and well delimited.

Distribution. Argentina, Bolivia, Chile, Colombia, Paraguay, Peru, Uruguay, USA.

Remarks. Included species may lack one or more of these diagnosis traits.

Checklist of *Mendozellus* Linnavuori species

albolectus DeLong & Cwikla, 1985. Argentina.
asunctia Cheng, 1980. Argentina, Paraguay.
brevipennis Linnavuori & DeLong, 1977. Chile.
devius Linnavuori & DeLong, 1977. Chile.
dubius Linnavuori, 1955. Argentina.
incisus DeLong, 1982. Bolivia.
isis Linnavuori, 1959. Argentina, Colombia.
laredanus Oman, 1934. USA.
lineiceps Osborn, 1923. Bolivia.
maipuanus Linnavuori & DeLong, 1977. Chile.
mallecoanus Linnavuori & DeLong, 1979. Chile.
minutus Linnavuori & DeLong, 1977. Chile.
paralaredanus **sp. n.** Uruguay.
patagonicus Linnavuori, 1959. Argentina.
rakitovi **sp. n.** Peru.
tarandus DeLong, 1982. Bolivia.

Key to species of *Mendozellus* Linnavuori (males)

The following species were described based on female specimens and are therefore omitted from the key: *M. brevipennis*, *M. incisus* and *M. lineiceps*.

1. Aedeagal apex narrowly emarginate in posteroventral view 2
- Aedeagal apex entire in posteroventral view (Fig. 2E). 6
2. Apophysis of style irregularly expanded apically, finely serrate. *M. isis*
- Apophysis of style finger-like. 3
3. Subgenital plate truncate apically. *M. devius*
- Subgenital plate acute apically. 4
4. Subgenital plate lateral margin convex. *M. tarandus*
- Subgenital plate lateral margin incurved. 5
5. Aedeagus with lateral processes oriented dorsad in lateral view. *M. mallecoanus*
- Aedeagus with lateral processes oriented posteroventrad in lateral view. *M. minutus*
6. Gonopore large, round, situated at apex of shaft (Fig. 5E). 7
- Gonopore not as above. 9
7. Forewing mostly dark brown contrasting with white commissural stripe (Fig. 4A–D). *M. paralaredanus* **sp. n.**
- Forewing coloration not as above. 8
8. Extreme apex of aedeagus attenuate in lateral view. *M. laredanus*
- Extreme apex of aedeagus rounded in lateral view. *M. albolectus*
9. Aedeagus without lateral teeth or processes (Fig. 7E). *M. rakitovi* **sp. n.**
- Aedeagus with lateral teeth or processes. 10
10. Aedeagus with pair of minute subapical tooth-like processes (Fig. 2E). *M. asunctia*
- Aedeagal with pair of depressed lateral triangular processes. 11
11. Apophysis of style short, apex truncate with acute lateral and medial angles. *M. dubius*
- Apophysis of style long, acuminate. 12
12. Aedeagus in ventral view abruptly constricted distad of lateral teeth with apical section nearly parallel sided. . *M. patagonicus*
- Aedeagus in ventral view evenly tapered from lateral teeth to apex. *M. maipuanus*

***Mendozellus asunctia* Cheng**
(Figs 1–3)

Mendozellus asunctia Cheng, 1980: 86.

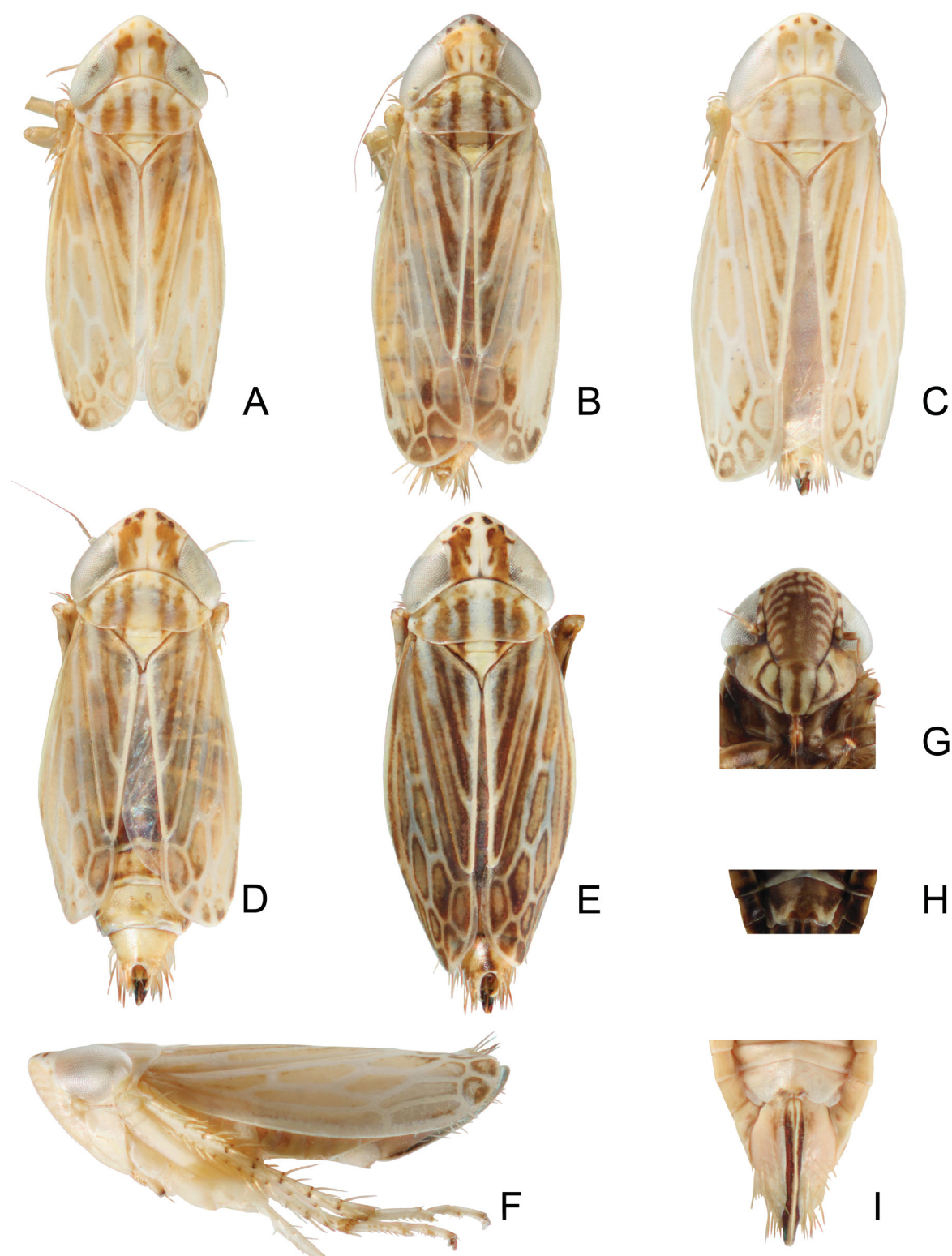


FIGURE 1. *Mendozellus asunctia* A–E: habitus, dorsal view; F: habitus, lateral view; G: face; H, I: the end of female abdomen, ventral view (H: without apex). A–B: male; C–I: female.

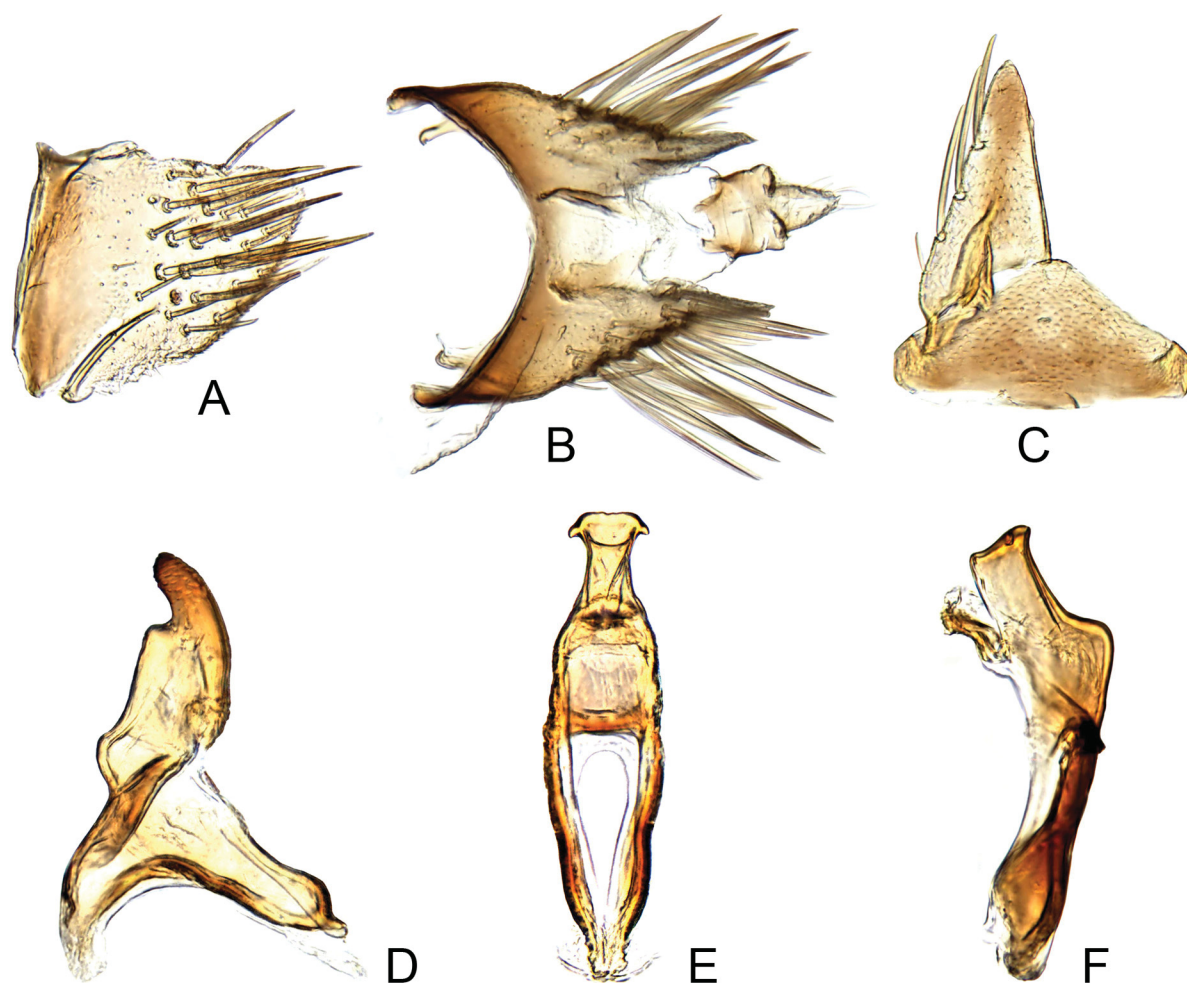


FIGURE 2. *Mendozellus asunctia* A: male pygofer lobe, lateral view; B: male pygofer and segments X–XI, dorsal view; C: valve and subgenital plate, ventral view; D: style, dorsal view; E, F: connective and aedeagus, dorsal and lateral view, respectively.

Length. Male: 2.0–2.4 mm; female: 2.6–3.0 mm.

Coloration and morphology. Ground color pale-yellow to brownish marked with orange to dark-brown; vertex, pronotum, mesonotum and scutellum with wide medial pale stripe. Vertex with variable marks usually consisting of four small apical spots, two oblique preapical bars mesad of anterior eye angles, and two small oblique lines farther posterad. Pronotum with six longitudinal stripes (Fig. 1A–E). Face mostly stramineous to dark brown, with paired white arcs on frontoclypeus (Fig. 1G). Forewing stramineous to brown with veins contrastingly pale (Fig. 1A–F). Mesosternum stramineous to dark brown. Tibiae with fuscous marks (Fig. 1F).

Head wider than pronotum, anterior margin forming approximately right angle in dorsal view, vertex longer than distance between eyes (Fig. 1A–E). Anteclypeus tapering to apex, extending beyond normal curve of genae. Lorum semicircular, slightly narrower than anteclypeus, well separated from lateral margin of face (Fig. 1G). Pronotum slightly shorter than vertex in male (Fig. 1A–B), as long as vertex in female (Fig. 1C–E). Forewing exposing apex of pygofer, with four short apical and three anteapical cells, middle anteapical cell divided by crossvein, inner anteapical cell closed basally, appendix reduced (Fig. 1A–F).

Male genitalia. Pygofer lightly sclerotized dorsally, pygofer lobe short, caudal margin angulate, with numerous macrosetae in distal half (Fig. 2A–B). Subgenital plate subtriangular, lateral margin weakly incurved, apex acute, with 2–3 macrosetae arising laterally (Fig. 2C). Style preapical lobe nearly rectangular; apophysis stout, slightly laterally curved with imbricate microsculpture; basal arms widely divergent (Fig. 2D). Aedeagus very short, truncate apically, widest proximally in lateral and dorsal view, bent dorsad near base in lateral view, apex with small apical tooth-like processes on each side; gonopore apical, large (Fig. 2E–F).

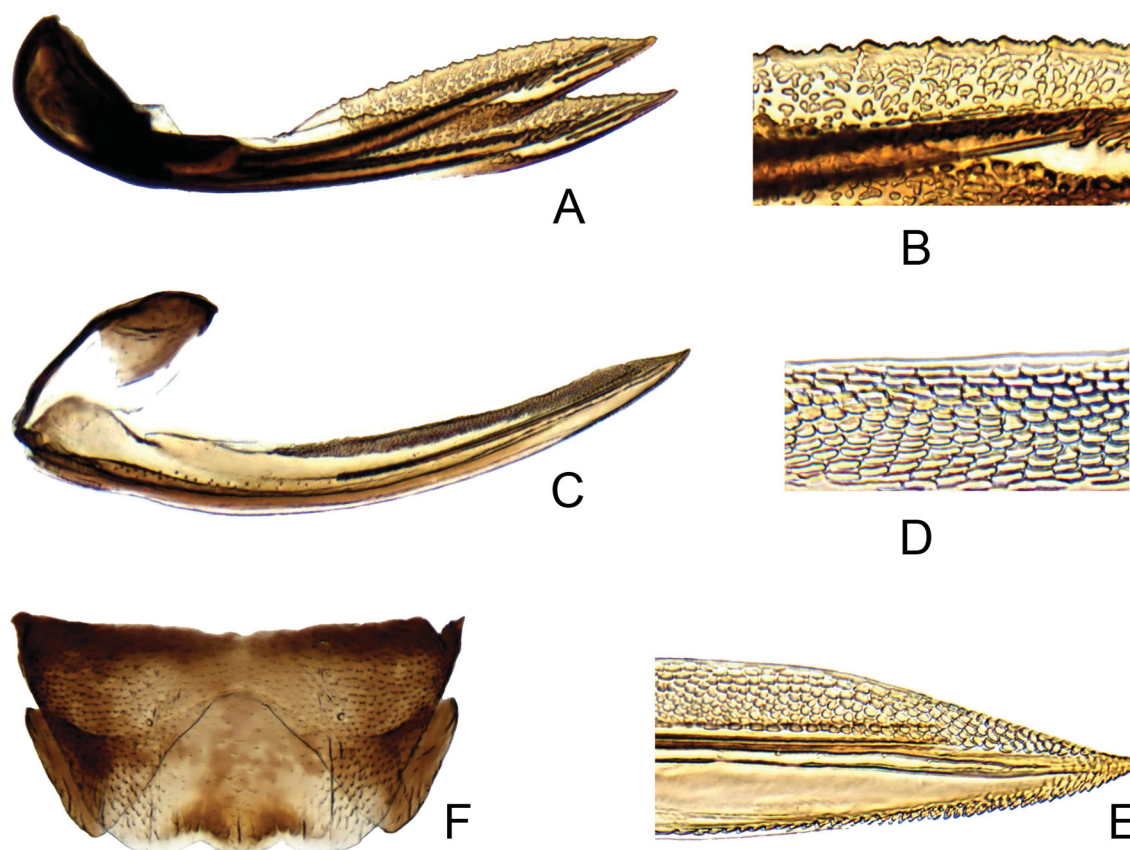


FIGURE 3. *Mendozellus asunctia* A: second valvula; B: detail of second valvula; C: first valvula; D: detail of first valvula; E: apex of first valvula; F: female sternite VII, ventral view.

Female ovipositor. Sternite VII with posterior margin undulate, with two posterolateral lobes attached on inner surface (Figs 1H–I, 3F). First valvula dorsal sculpturing granulose to maculose, submarginal for most of length (Fig. 3C–E). Second valvula with dorsal hyaline area broad, distal blade broader than basal section, dorsal margin with approximately 16 small obliquely triangular teeth with small serrations between teeth, apex acuminate (Fig. 3A–B).

Material examined. ARGENTINA: Chaco P.N. Chaco: 1♂, 70m, 26°48'50"S, 59°36'52"W, 12-I-2008, C.H. Dietrich, vacuum, Ar10-13, INHS; 1♀, 70m, 26°48'50"S, 59°36'52"W, 12-I-2008, C.H. Dietrich, vacuum, Ar10-11, INHS; Jujuy: 2♂, rt 9 25km, N Yala, 2,200m, 23°57'2"S, 65°27'57"W, 18-I-2008, C.H. Dietrich, vacuum, AR20-1, INHS; 2♀, rt 9 23km, N Yala, 2,150m, 23° 57'41" S, 65° 27'38" W, 18-I-2008, C.H. Dietrich, vacuum, AR21-1, INHS; 2♂, 13 km N El Carmen, 1,300m, 24°16'44"S, 65°16'32"W, 18-I-2008, C.H. Dietrich, vacuum, AR22-1, INHS; 4♂, 2♀, 13 km N El Carmen, 1,300m, 24°16'44"S, 65°16'32"W, 18-I-2008, C.H. Dietrich, sweeping, AR22-2, INHS; 1♀, La Cienaga 4 km S El Carmen, 1,250m, 24°25'5"S, 65°17'27"W, 18-I-2008, C.H. Dietrich, vacuum, AR231, INHS.

Distribution. Argentina, Paraguay.

Remarks. This species was originally described from Paraguay by Cheng (1980). Some intraspecific variation in wing development and coloration was found and Cheng's original drawings are not detailed, so we redescribe this species. The specimens examined represent the first records of the species from Argentina. The ovipositor is illustrated for the first time.

***Mendozellus paralaradanus* sp. n.**
(Figs 4–5)

Length. Male: 2.3–2.5 mm; female: 2.4–2.7 mm.

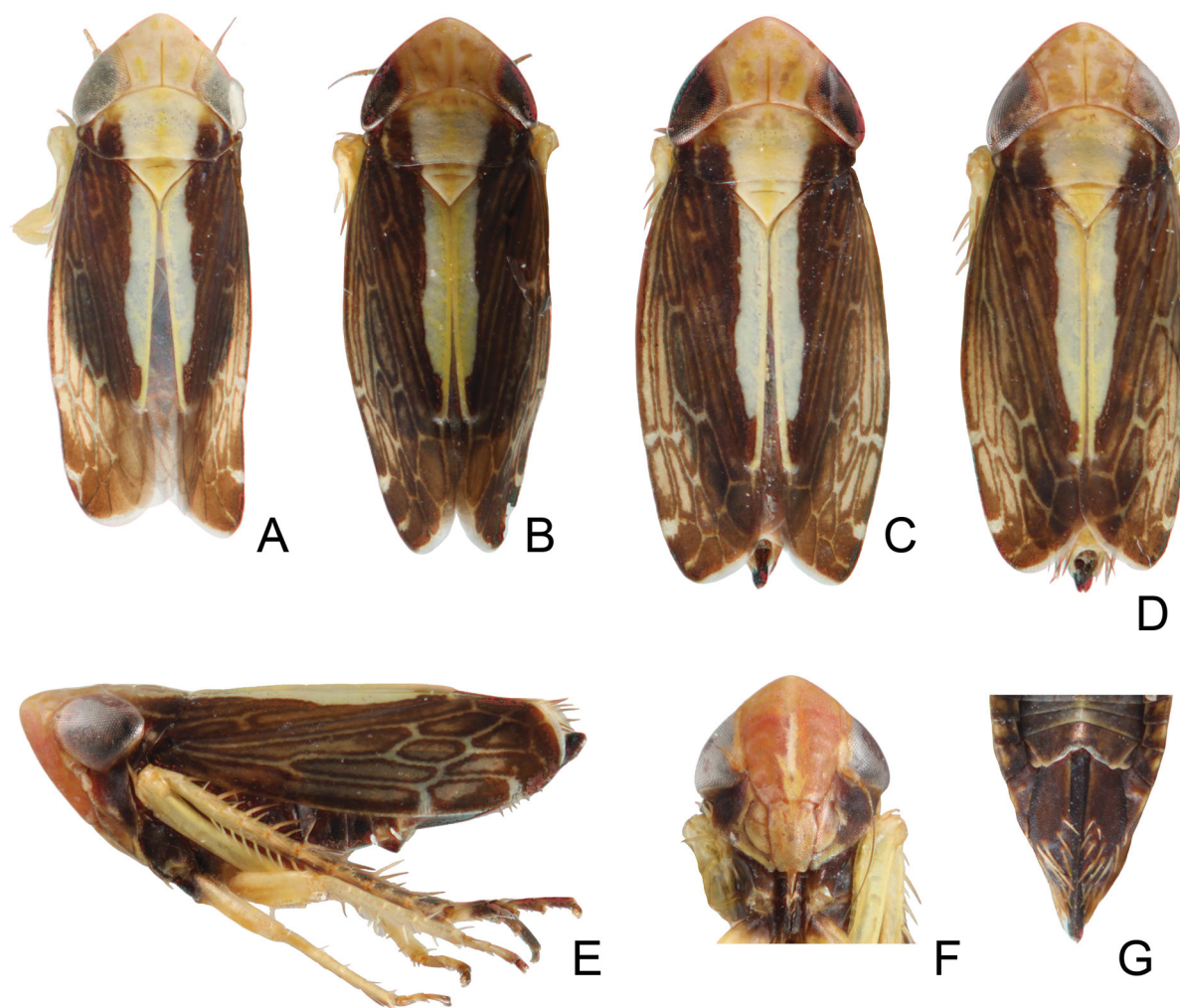


FIGURE 4. *Mendozellus paralaredamus* A–D: habitus, dorsal view; E: habitus, lateral view; F: face; G: the end of female abdomen, ventral view. A–B: male; C–G: female.

Coloration and morphology. Ground color reddish brown marked with white; vertex, pronotum, mesonotum, scutellum, and inner margin of forewing with wide medial pale line. Vertex with faint marks. Pronotum with four white longitudinal stripes in addition to medial pale line (Fig. 4A–D). Face light reddish brown, with paired white arcs and white longitudinal stripe on frontoclypeus (Fig. 4F). Forewing with veins pale, inner margin of clavus with broad white band (Fig. 4A–D). Mesosternum dark. Tibiae with dark marks (Fig. 4E).

Head wider than pronotum, anterior margin distinctly angulate in dorsal view, vertex longer than distance between eyes (Fig. 4A–D). Anteclypeus tapering to apex, extending beyond normal curve of genae. Lorum semicircular, slightly narrower than anteclypeus, well separated from lateral margin of face (Fig. 4F). Pronotum nearly as long as vertex (Fig. 4A–D). Forewing exposing apex of pygofer in female, with four short apical and three anteapical cells, middle anteapical cell with one crossvein, inner anteapical cell usually closed basally, appendix reduced (Fig. 4A–E).

Male genitalia. Pygofer lightly sclerotized dorsally, pygofer lobe short, caudal margin bluntly angled, with numerous macrosetae in posterior region (Fig. 5A–B). Subgenital plate subtriangular, lateral margin more or less straight, apex acute, with 4–5 macrosetae arising laterally (Fig. 5C). Style preapical lobe nearly rectangular; apophysis stout, slightly laterally curved with imbricate microsculpture; basal arms very strongly divergent (Fig. 5D). Aedeagus in lateral view stout and broadly upturned on distal third, with lateroventral tooth distally; gonopore subapical on ventral surface, very large (Fig. 5E–F).

Female ovipositor. Sternite VII with posterior margin concave medially, with two posterolateral lobes attached on inner surface (Fig. 4G). First and second valvulae as in *M. asunctia* Cheng.

Type material. Holotype ♂, Uruguay, Colonia, Ruta 21, km 194, San Pedro, 23-XII-1983, G.J. Wibmer, INHS. Paratypes: 9♂, 9♀, same data; 1♂, 4♀, Uruguay, Colonia, Piedra de los Indios, ca. Ruta 21, km 184 1/2, 23-XII-2005, G.J. Wibmer, INHS.

Etymology. The specific epithet is based on the similarity of this species to *M. laredanus* Oman.

Remarks. This species closely resembles *M. laredanus* Oman and *M. albolectus* DeLong & Cwikla, but is readily distinguishable by color, the shape of the style, and the apex of the aedeagal shaft.

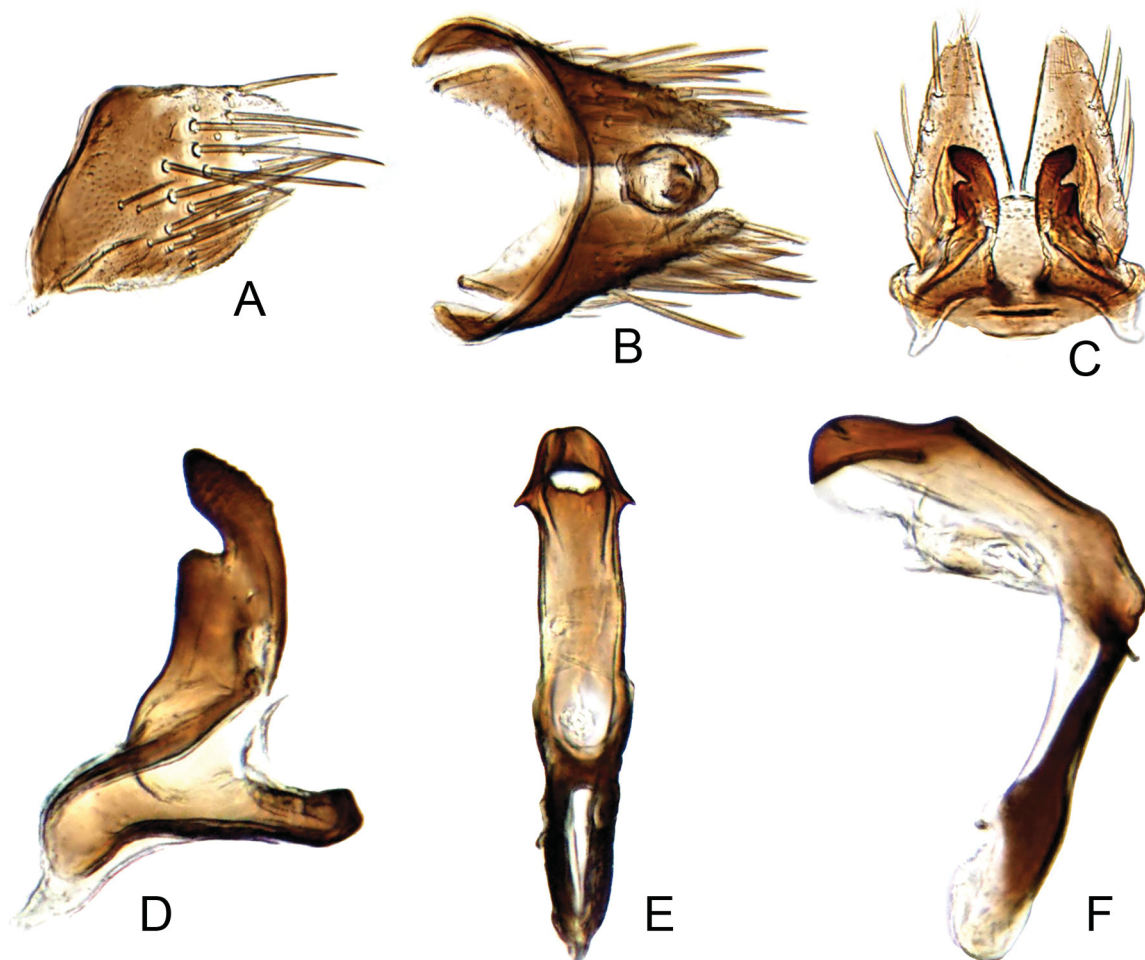


FIGURE 5. *Mendozellus paralaredanus* A: male pygofer lobe, lateral view; B: male pygofer and segments X–XI, dorsal view; C: valve, subgenital plates and styles, ventral view; D: style, dorsal view; E, F: connective and aedeagus, dorsal and lateral view, respectively.

***Mendozellus rakitovi* sp. n.**
(Figs 6–7)

Length. Male: 2.8 mm; female: 3.4 mm.

Coloration and morphology. Ground color pale ochraceous marked with black-brown; vertex, pronotum, mesonotum and scutellum with wide medial pale line. Vertex with black-brown marks. Pronotum with six black-brown longitudinal stripes (Fig. 6A–B, 6G). Face stramineous, with paired white arcs on frontoclypeus (Fig. 6H). Forewing subhyaline with veins contrastingly pale, veins sometimes bordered with fuscous (Fig. 6A–F). Mesosternum pale ochraceous. Tibiae with dark marks (Fig. 6C–D).

Head wider than pronotum, anterior margin distinctly angulate in dorsal view, vertex slightly shorter than distance between eyes (Fig. 6A–B). Anteclypeus tapering to apex, extending beyond normal curve of genae. Lorum semicircular, slightly narrower than anteclypeus, well separated from lateral margin of face (Fig. 6H). Pronotum nearly as long as vertex (Fig. 6A–B). Forewing exposing apex of pygofer, with four short apical and

three anteapical cells, middle anteapical cell with one-three crossveins, inner anteapical cell closed basally sometimes with one crossveins, appendix reduced (Fig. 6A–F).

Male genitalia. Pygofer lightly sclerotized dorsally, pygofer lobe long, caudal margin round, with numerous macrosetae in posterior region (Fig. 7A–B). Subgenital plate subtriangular, lateral margin weakly incurved, apex acute, with 5–6 macrosetae arising laterally (Fig. 7C). Style preapical lobe nearly rectangular; apophysis stout, slightly laterally curved (Fig. 7C). Aedeagus simple, without processes, in lateral view upturned distally, thinnest at midlength; gonopore apical (Fig. 7E–F).

Female ovipositor. Sternite VII with posterior margin concave medially, with two posterolateral lobes attached on inner surface (Fig. 6I). First and second valvulae as in *M. asunctia* Cheng.

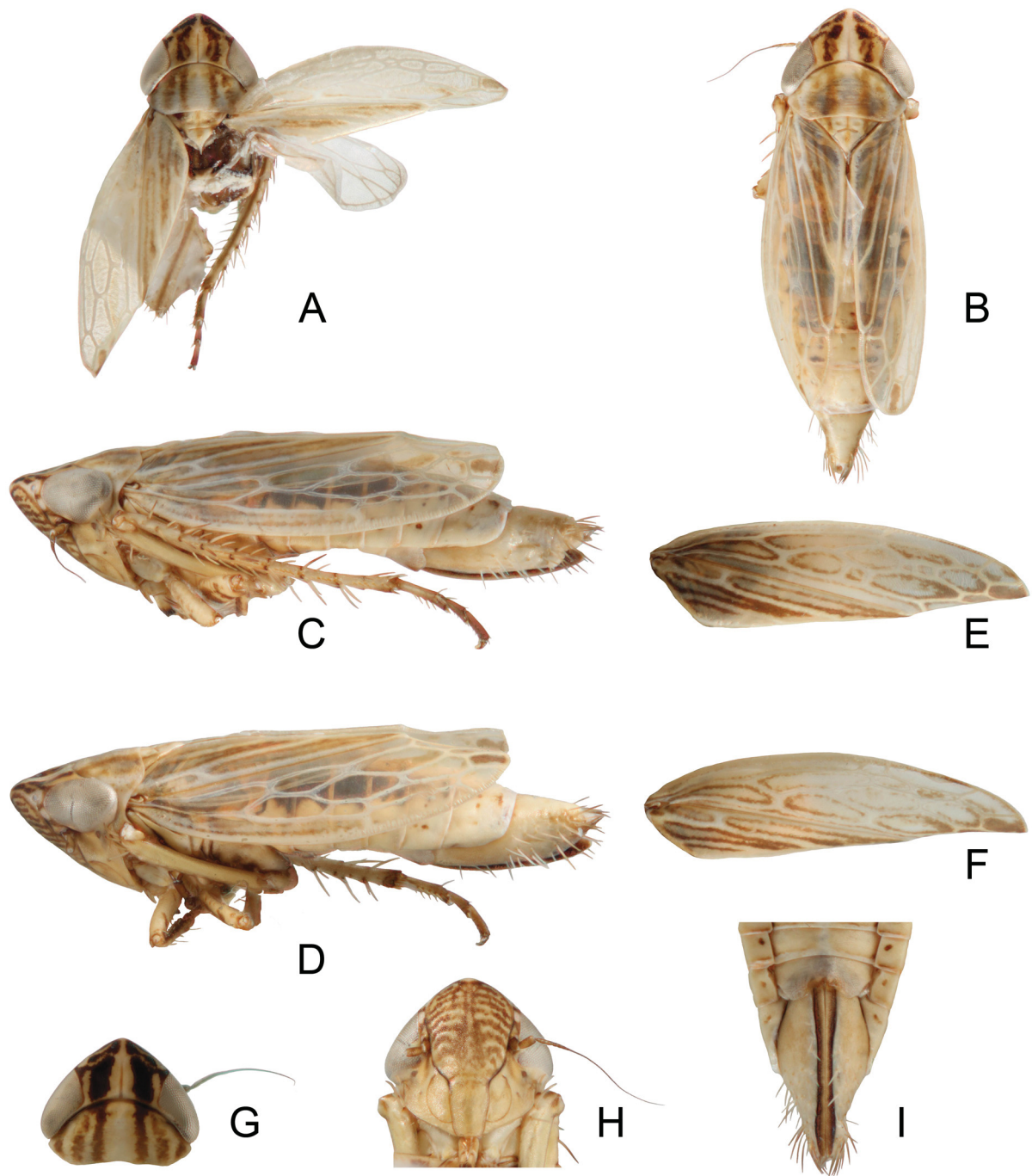


FIGURE 6. *Mendozellus rakitovi* A–B: habitus, dorsal view; C–D: habitus, lateral view; E–F: forewing; G: head and pronotum; H: face; I: the end of female abdomen, ventral view. A, E–G: male; B–D, H–I: female.

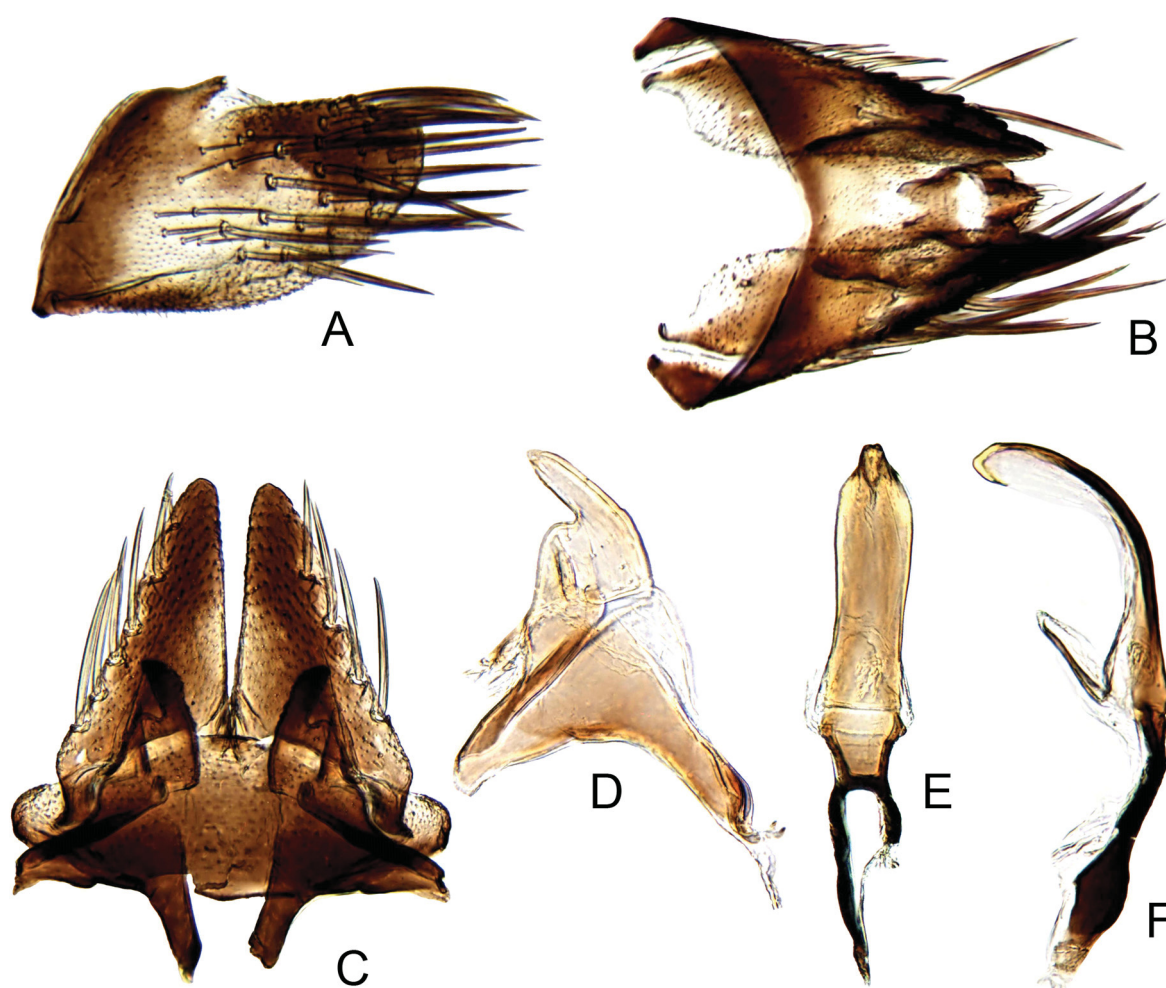


FIGURE 7. *Mendezellus rakitovi* A: male pygofer lobe, lateral view; B: male pygofer and segments X–XI, dorsal view; C: valve, subgenital plates and styles, ventral view; D: style, dorsal view; E, F: connective and aedeagus, dorsal and lateral view, respectively (broken).

Type material. Holotype ♂, Peru: Junin, 42 km NE La Oroya, 4,000m, 11°24'18"S, 75°50'31"W, 17-X-2002, C.H. Dietrich & R. Rakitov, sweeping, 02-15-2, USML. Paratypes: 1♂, 1♀, same data, INHS.

Etymology. This species is named for Dr. Roman Rakitov of the Paleontological Institute, Moscow, who organized the collecting trip that yielded the type specimens.

Remarks. This species resembles *M. paralaredanus* sp. n., but is readily distinguishable by color and the shape of the aedeagus. Fig. 7D comes from a teneral specimen (male paratype) with genitalia only lightly sclerotized.

Species removed from *Mendezellus* Linnavuori

Haldorus serratus (DeLong), comb. n.

Mendezellus serratus DeLong, 1982: 613.

Remarks. According to DeLong's (1982) original drawings and description, this species has a pair of long processes arising from the base of the aedeagus and extended distad, and is, therefore more appropriately placed in *Haldorus* Oman.

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References

- Blocker, H.D., Fang, Q.Q. & Black, W.C. (1995) Review of Nearctic *Deltocephalus*-like Leafhoppers (Homoptera: Cicadellidae). *Annals of the Entomological Society of America*, 88 (3), 294–315.
<https://doi.org/10.1093/aesa/88.3.294>
- Cheng, Y.J. (1980) New leafhopper taxa (Homoptera: Cicadellidae: Deltocephalinae) from Paraguay. *Journal of the Kansas Entomological Society*, 53 (1), 61–111.
- DeLong, D.M. (1926) A monographic study of the North American species of the genus *Deltocephalus*. *University Studies. The Ohio State University. Contributions in Zoology and Entomology*, 2 (13), i–x, 1–129.
- DeLong, D.M. (1982) Some new Neotropical leafhoppers of the subfamilies Iassinae and Deltocephalinae (Homoptera: Cicadellidae). *Proceedings of the Entomological Society of Washington*, 84 (3), 610–616.
- DeLong, D.M. & Cwikla, P.S. (1985) New Neotropical Deltocephalinae (Homoptera: Cicadellidae). *Journal of the Kansas Entomological Society*, 57 (4), 725–728.
- Dietrich, C.H. (2005) Keys to the families of Cicadomorpha and subfamilies and tribes of Cicadellidae (Hemiptera: Auchenorrhyncha). *Florida Entomologist*, 88, 502–517.
[https://doi.org/10.1653/0015-4040\(2005\)88\[502:KTTFOC\]2.0.CO;2](https://doi.org/10.1653/0015-4040(2005)88[502:KTTFOC]2.0.CO;2)
- Kramer, J.P. (1971) North American deltocephaline leafhoppers of the genus *Planicephalus* with new generic segregates from *Deltocephalus*. *Proceedings of the Entomological Society of Washington*, 73 (3), 255–268.
- Linnavuori, R. (1955) Contributions to the Neotropical leafhopper fauna of the family Cicadellidae IV. (Continued). *Suomen Hyonteistieteellinen Aikakauskirja. Annales Entomologici Fennici*, 21, 113–129.
- Linnavuori, R. (1959) Revision of the Neotropical Deltocephalinae and some related subfamilies (Homoptera). *Annales Zoologici Societatis Zoologicae Botanicae Fennicae 'Vanamo'*, 20 (1), 1–370.
- Linnavuori, R.E. & DeLong, D.M. (1977) The leafhoppers (Homoptera: Cicadellidae) known from Chile. *Brenesia*, 12 & 13, 163–267.
- Linnavuori, R.E. & DeLong, D.M. (1979) Additional notes on the Biturritidae and Cicadellidae (Homoptera) of Chile. *Brenesia*, 16, 189–196.
- Oman, P.W. (1934) New species and a new genus of North American deltocephaline leafhoppers (Hemiptera: Homoptera). *Proceedings of the Entomological Society of Washington*, 36, 75–80.
- Osborn, H. (1923) Neotropical Homoptera of the Carnegie Museum. Part 2. Records and descriptions of five new genera and sixty five new species of the subfamily Jassinae. *Annals of the Carnegie Museum*, 15, 27–79.