Bol. Mus. Nac. Hist. Nat. Parag. Vol. 28, Art. e2024001: 3–13

A new species of planthopper in the genus *Mnemosyne* Stål (Hemiptera: Auchenorrhyncha: Fulgoromorpha: Cixiidae) from Paraguay

Una nueva especie de fulgoromorfo del género *Mnemosyne* Stål (Hemiptera: Auchenorrhyncha: Fulgoromorpha: Cixiidae) del Paraguay

Solomon V. Hendrix[1,2], Charles R. Bartlett[1,3]*, Thierry Bourgoin[4] & John M. Leavengood, Jr.[5]

[1]University of Delaware, Department of Entomology and Wildlife Ecology, 250 Townsend Hall, Newark, DE 19716-2160, USA. [2]E-mail: solvhent@udel.edu. [3]E-mail: Bartlett@udel.edu.
[4]Institut Systématique, Evolution, Biodiversité (ISYEB), UMR 7205 MNHN-CNRS-Sorbonne Université-EPHE-Univ. Antilles, Museum National d'Histoire Naturelle, CP 50, 57 Rue Cuvier, F-75005, Paris, France. E-mail: thierry.bourgoin@mnhn.fr.
[5]United States Department of Agriculture (APHIS, PPQ), 9325 Bay Plaza Blvd, Suite 206, Tampa, FL 33619, USA. E-mail: john.m.leavengood@usda.gov.
*Corresponding author.

https://zoobank.org/References/6560CAA2-7946-459D-8A20-42ECD9A4C57C

Abstract.- A new species of *Mnemosyne* Stål, *M. guairensis* **n. sp.** (Cixiidae: Cixiinae: Mnemosynini) is described from the Guairá Department, Paraguay, bringing the number of *Mnemosyne* species known from the New World to 24 and total world species to 50. This is the first species of *Mnemosyne* recorded from Paraguay.

Key Words*: Planthopper, Mnemosynini, new species, neotropical.*

Resumen.- Se describe una nueva especie de *Mnemosyne* Stål, *M. guairensis* **n. sp.** (Cixiidae: Cixiinae: Mnemosynini) del Departmento Guairá, Paraguay, elevando el número de especies de *Mnemosyne* del Nuevo Mundo a 24 y el total de especies del mundo a 50. Esta es la primera especie de *Mnemosyne* que se registra de Paraguay.

Key Words*: Fulgoroidea, Mnemosynini, especie nueva, neotropical.*

Introduction

The genus *Mnemosyne* Stål, 1866a (Cixiidae: Cixiinae: Mnemosynini Emeljanov, 1992) consists of 50 species distributed widely in tropical regions (including the Caribbean, South America, Africa, India, Southeast Asia, Indomalaya, and Australia) (Bourgoin 2023, Hendrix & Bartlett, *in press*). *Mnemosyne* is the only extant genus in the Mnemosynini, which otherwise includes five extinct genera (Szwedo 2004, Szwedo et al. 2006, 2019; Bourgoin 2023). The features of the tribe were described in detail by Szwedo (2004) in comparison to Pentastirini Emeljanov, 1971. Mnemosynini is similar to Pentastirini in having five carinae on the mesonotum. These tribes differ most notably in the relationship between the base of the anal tube and the theca (in Pentastirini the base of the aedeagus connects to the pygofer; in Mnemosynini, as is typical in Cixiidae, the aedeagus is connected entirely to the anal tube, which is connected to the pygofer), the forewing venation (the MP vein has veins MP_{3+4} forking well proximad of MP_{1+2} in Mnemosynini and the reverse in Pentastirini) and the presence of lines of setae in the cells between veins in Mnemosynini (absent in Pentastirini). In practice, *Mnemosyne* is easily recognized as a large taxon (8+ mm) bearing rows (or patches) of tubercles between the veins of the forewing.

Most species in *Mnemosyne* were reviewed by Van Stalle (1985, 1987, 1988), except the Australian region by Löcker et al. (2006). Van Stalle (1987) considered the Neotropical species, redescribing five known species, describing 17 as new, and providing a key to species. As currently comprised, *Mnemosyne* may be he-

Recibido: 21.ix.2023 Aceptado: 17.xi.2023 Publicado online: 6.ii.2024

terogeneous (Szwedo 2004). Within the New World taxa, Van Stalle (1987) informally divided *Mnemosyne* into Caribbean and continental groups and noted that additional sampling would increase the number of species in the genus. Herein we describe a new species of *Mnemosyne* from Paraguay.

Materials and Methods

Morphological terminology generally follows Van Stalle (1987), except male terminalia nomenclature updated after Bourgoin (1988) and Bourgoin & Huang (1990), and forewing venation following Bourgoin et al. (2015).

Specimens were collected under permit #Invet-0392 (issued: 21.XII.2019) and exported under permit #25/2019. Specimens examined were provided with 2D barcode labels and data was captured using "Arthropod Easy Data Capture" into the Tritrophic Thematic Collection Network Database (https://research.amnh.org/pbi/locality/) (Schuh et al. 2010, Schuh 2012, Arthropod Easy Capture 2013). Data from this database was compiled along with iNaturalist (https://www.inaturalist.org/) and iDigBio (https://www.idigbio.org/) records to produce a distribution map using Simplemappr (Shorthouse 2010). Label information for primary types is quoted with "/" indicating a new line and "//" indicating a new label, and with comments in square brackets. Abbreviations for specimen depositories are as follows:

FSCA – Florida State Collection of Arthropods, Gainesville, FL, USA;

IBNP – Museo Nacional de Historia Natural del Paraguay, San Lorenzo, Paraguay;

JMLC – John M. Leavengood, Jr., private collection, Brandon, FL, USA;

MNHN – Muséum National d'Histoire Naturelle, Paris, France;

UDCC – University of Delaware Insect Research Collection, Newark, DE, USA;

USNM – Smithsonian Institution, National Museum of Natural History, Washington, D.C, USA.

Systematics

Family Cixiidae Spinola, 1839

Subfamily Cixiinae Spinola, 1839

Tribe Mnemosynini Emeljanov, 1992

Genus *Mnemosyne* Stål, 1866a

Type species: *Mnemosyne cubana* Stål, 1866b (by monotypy).

Amended diagnosis. Large (generally 8+ mm), robust species. Mesonotum bearing 5 carinae (intermediate carinae may be weak or absent, especially in New World taxa; Van Stalle 1987). Setiferous tubercles in cells of forewing; MP_{3+4} forking proximad of MP_{1+2}. Gonostyli fused basally with a small process at place of fusion. Aedeagus directly articulated to anal tube (not pygofer). Ovipositor reduced.

Etymology. Named after the goddess of memory in Greek mythology. The genus is feminine in gender (Dmitriev 2022).

Mnemosyne guairensis n. sp.

https://zoobank.org/NomenclaturalActs/77A1A756-0C1C-457C-BA76-336800754766

(Figures 1-5)

Type locality. Paraguay, Guairá Department, near Independencia, Hotel Independencia, S 25°43.069' W 56°16.443'.

Diagnosis. General body color deep brown, face uniformly dark brown. Vertex wider than long, lateral margins somewhat foliaceous and contiguous with subapical transverse carinae to form roughly triangular depression. Hind tarsus with (3+3)/5/5 apical teeth. Pygofer of male terminalia with single rounded lobe on lateral margin, medioventral lobe apically bifid, apex appearing cordate. Anal tube with single broad, distally tapering apical process.

Description. *Color*. General body color deep brown with irregular and diffuse paler markings (Fig. 1A, B). Carinae of head paler (except

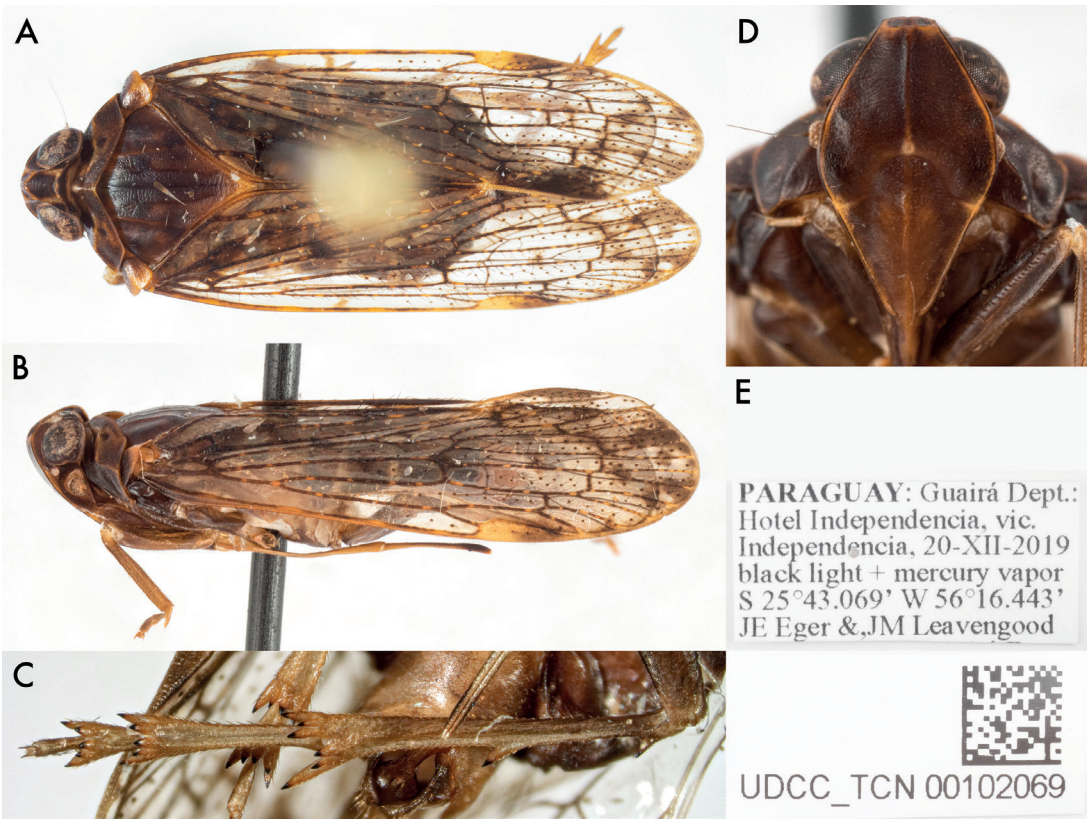

Figure 1. *Mnemosyne guairensis* n. sp. (paratype); **A)** dorsal habitus, **B)** lateral habitus, **C)** hind tibia ventral view, **D)** frontal view, **E)** labels.

median carina of frons and clypeus concolorous. Fig. 1D). Tibiae and tarsi of legs paler. Forewings transparent with a few irregular dark markings (especially in claval region and near wing apex) and dark veins (costa and stigma paler) bearing pale dashes.

Structure. Body size, including wings: males - $\bar{x}$ = 9.76 mm (range 9.22-10.21 mm, n=7), females - $\bar{x}$ = 10.57 mm (range 10.23-11.01 mm, n=9). Head much narrower than pronotum (Fig. 1A). In dorsal view, vertex irregularly triangular, wider than long, broadest near posterior margin (width hind margin 1.7x length at midline); lateral margins carinate and somewhat foliaceous (especially posteriorly), sinuate and apparently converging near head apex (lateral carinae contiguous with subapical transverse carinae) to define a depressed median disc; median carina absent. Apical transverse carina present, connected apically with subapical transverse carinae by a short pair of carinae, defining a small rectangular areolet medially and a pair of lateral compartments; posterior margin of head distinctly convex and carinate. Face (frons+clypeus), in frontal view (Fig. 1D), smooth and broadly rhomboid, widest just above the frontoclypeal suture; lateral carinae straight and regularly diverging from apical transverse suture to arch near level of antennae, converging below antennae to labrum; median carina present (not forked near apical transverse carina); frontoclypeal suture shaped like the Greek letter omega (Ω), with central arch defining semicircular exsection. Median ocellus conspicuous just above frontoclypeal suture. In lateral view, lateral ocellus conspicuous at anteroventral margin of eye. Eye obliquely oval (slightly emarginate above antenna, Fig. 1B). Antennae short, scape

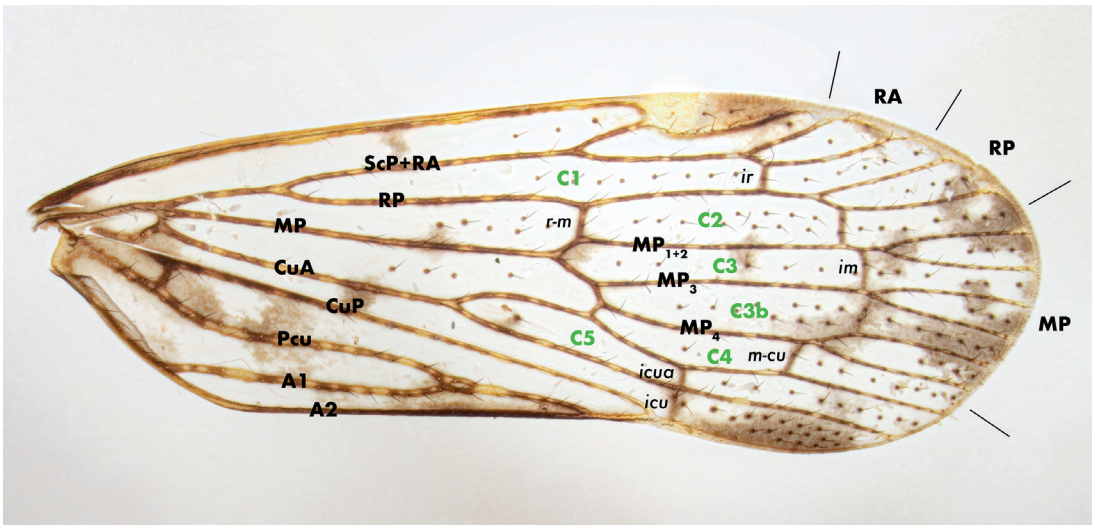

Figure 2. *Mnemosyne guairensis* n. sp. (paratype), forewing venation; abbreviations following Bourgoin et al. (2015) (veins in black font, crossveins in italic, cells in green font).

ring-like, pedicel bulbous, about as tall as wide bearing many sensory plaques, flagellum finely setaceous with bulbous base. Rostrum very long, nearly exceeding pygofer.

Pronotum in dorsal view (Fig. 1A) slightly shorter than midlength of vertex, anterior margin convex, posterior margin broadly angularly concave; median carina present, transverse carinae from near midpoint of median carina extending sinuately laterad to lateral margin of dorsal view; lateral margin of pronotum with carina extending between eye and tegula; paradiscal region broad, narrowing ventrally to truncate apex below level of antenna. Length of mesonotum about twice midlength of pronotum and vertex combined, scutellum sharply pointed, not clearly set off from scutum; distinctly 5-carinate, lateral carinae weakly diverging, straight, and

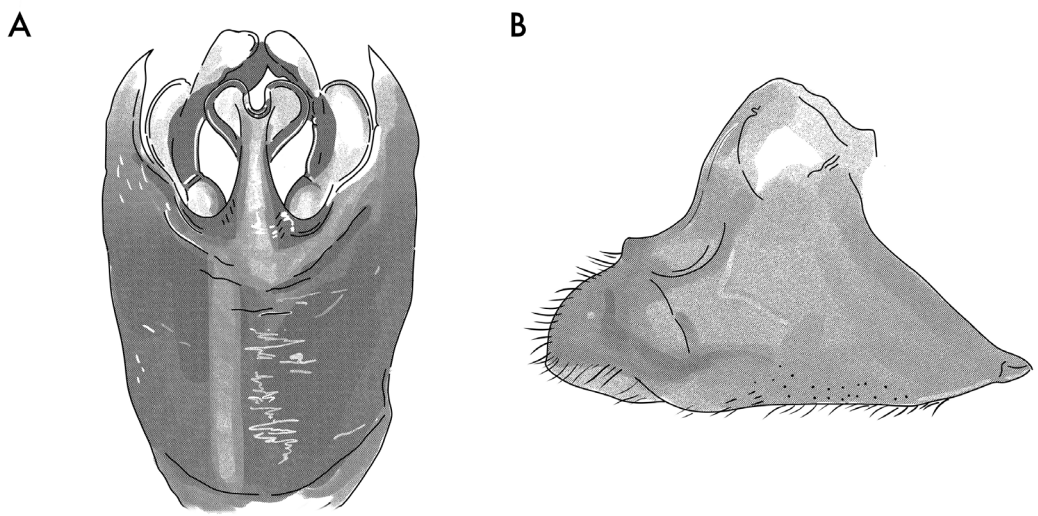

Figure 3. *Mnemosyne guairensis* n. sp. (paratype), illustrated male terminalia; **A)** ventral view, pygofer and gonostyli; **B)** right lateral view, pygofer. Line art by Meredith June Willmott.

complete (reaching hind margin), intermediate carinae sinuate, median carina caudally becoming obscure on scutellum. Tibiae of hind legs (Fig. 1C) with 2 large lateral spines; apical ornamentation with (3+3)/5/5 apical teeth, teeth generally large, teeth at apex of basitarsus irregular in length. Forewing broad (Fig. 2), weakly spatulate, costal margin weakly convex, trailing margin concave (inflection at apex of clavus), apex broadly rounded; remigium with rows of setiferous tubercles in nearly all cells, especially toward apex (most cells with single row, C2 and C3b with two rows, innermost apical cell with three rows); apex of clavus exceeding wing midlength, stigma large and distinct, fusion of veins Pcu + A1 in distal third of clavus, around level of fork of CuA; fork of ScP+RA from RP in proximal quarter of wing, fork of MP_{1+2} from

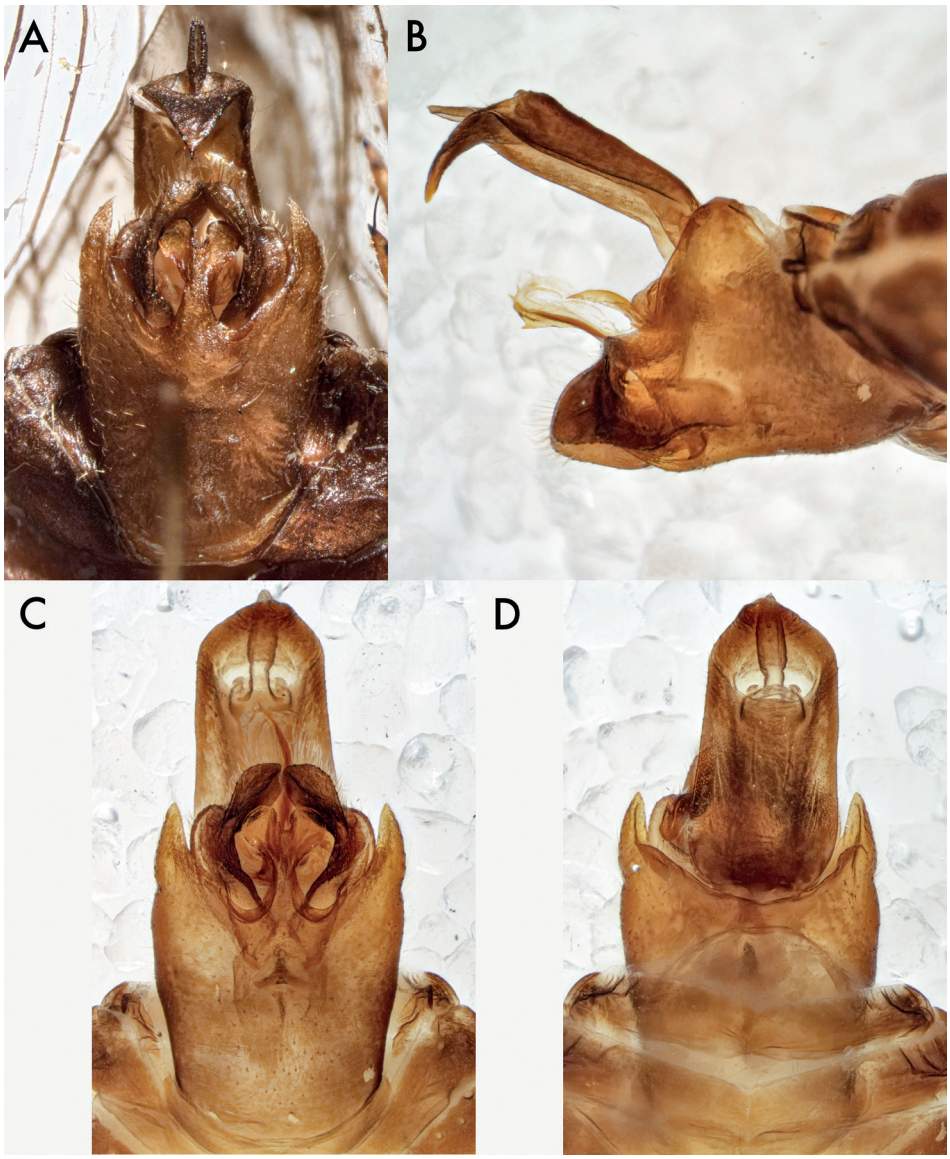

Figure 4. *Mnemosyne guairensis* n. sp. (paratype), intact male terminalia; **A)** ventral view, intact specimen, **B)** lateral view, terminalia cleared with KOH, **C)** ventral view, terminalia cleared with KOH, **D)** dorsal view, terminalia cleared with KOH.

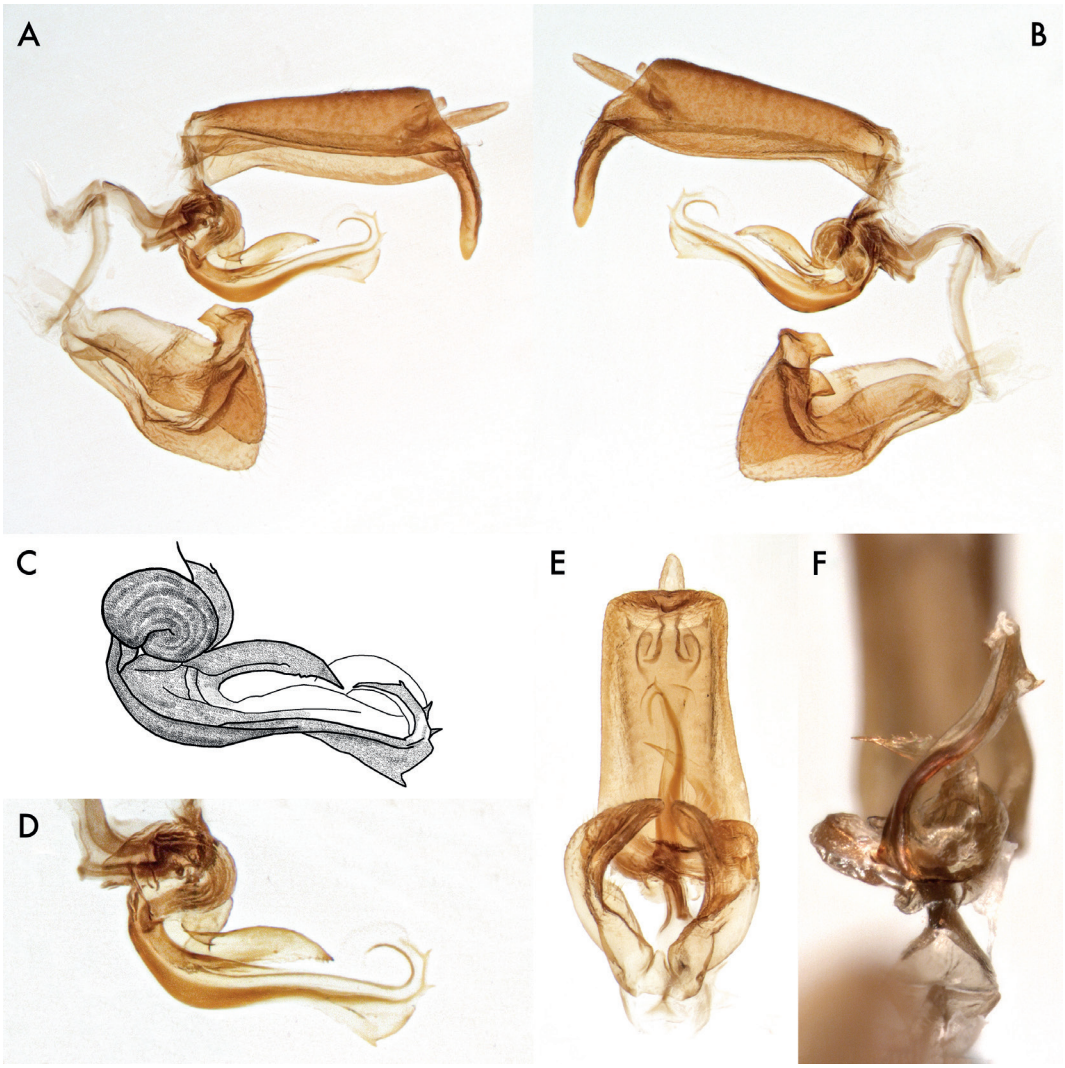

Figure 5. *Mnemosyne guairensis* n. sp. (paratype), male terminalia dissociated from pygofer; **A)** right lateral view, aedeagal complex including gonostyli and anal tube; **B)** same, left lateral view; **C)** line art of aedeagal complex, left lateral view; **D)** aedeagal complex, left lateral view; **E)** aedeagal complex, caudoventral view (showing basal fusion of gonostyli); **F)** aedeagus, ventral view (dried). Line art by Kimberley J. Shropshire.

MP_{3+4} near wing midlength with fork of MP_3 from MP_4 soon after; branching pattern RA 2-branched, RP 2-branched, MP 6-branched, CuA 2-branched.

Male terminalia bilaterally symmetrical (except aedeagus) with pygofer broad and irregularly triangular (broadest ventrally) in lateral view (Fig. 3B); caudal margin (lateral margin of pygofer opening) bearing one rounded lobe (just taller than wide) on each side of opening; in ventral view, medioventral lobe of pygofer (Figs. 4A, 4C, 3A) elongate (about equal to lateral lobes), apically bifurcate, apical portion appearing cordate (with broad median concavity) resting on a stout stem. Gonostyli (Figs. 5A, B) relatively short, broad, and flattened with a medially cupped appearance; in ventral view, curled to nearly meet apically, distal portions

setaceous; in lateral view apical third angled dorsal, lateral margin forming a stout blunt process (gonostyli bases medially fused, Fig. 5E). Aedeagus (Fig. 5) weakly sclerotized, flattened, apically curved, and bearing four large spines on outer margin and broad membranous flange on left lateral side (just before apical curve); endophallus with a pair of membranous inversely curved processes (appearing as spherical lobes, one at each side of aedeagal base) and an elongate, stout, sharp falcate process (serrate on inner margin) arising dorsally of the aedeagus (reaching about half length of aedeagus). Anal tube (Figs. 5A, B) elongate, exceeding pygofer apex; in lateral view, becoming broader distally, apex curved into thick process (elongated, but shorter than other species in the genus); in caudal view anal tube apex triangular, broad at base, evenly tapering to pointed apex; anal tube in dorsal view broad and roughly quadrangular (apical portion rounded); paraproct elongated, cylindrical with stalk-like base.

Plant associations. None.

Distribution. Paraguay.

Etymology. The specific name is based on the name of the department in Paraguay from which the type species was collected (Guairá), with the terminal "a" truncated and the suffix '–*ensis*', to indicate the species was from Guairá. The name is intended as feminine in gender.

Material examined. Holotype male (dissected, deposited USNM) "PARAGUAY: Guairá Dept.: / Hotel Independencia, vic. / Independencia, 20-XII-2019 / black light + mercury vapor / S 25°43.069' W 56°16.443' / JE Eger &,JM Leavengood // UDCC_TCN 001022076 [2D barcode] // HOLOTYPE / Mnemosyne / guairensis"

Paratypes (same data) 9 females, 8 males deposited FSCA (2 male, 2 female), IBNP (1 male, 1 female), JMLC (1 male, 1 female), MNHN (2 male, 2 female), UDCC (1 male, 1

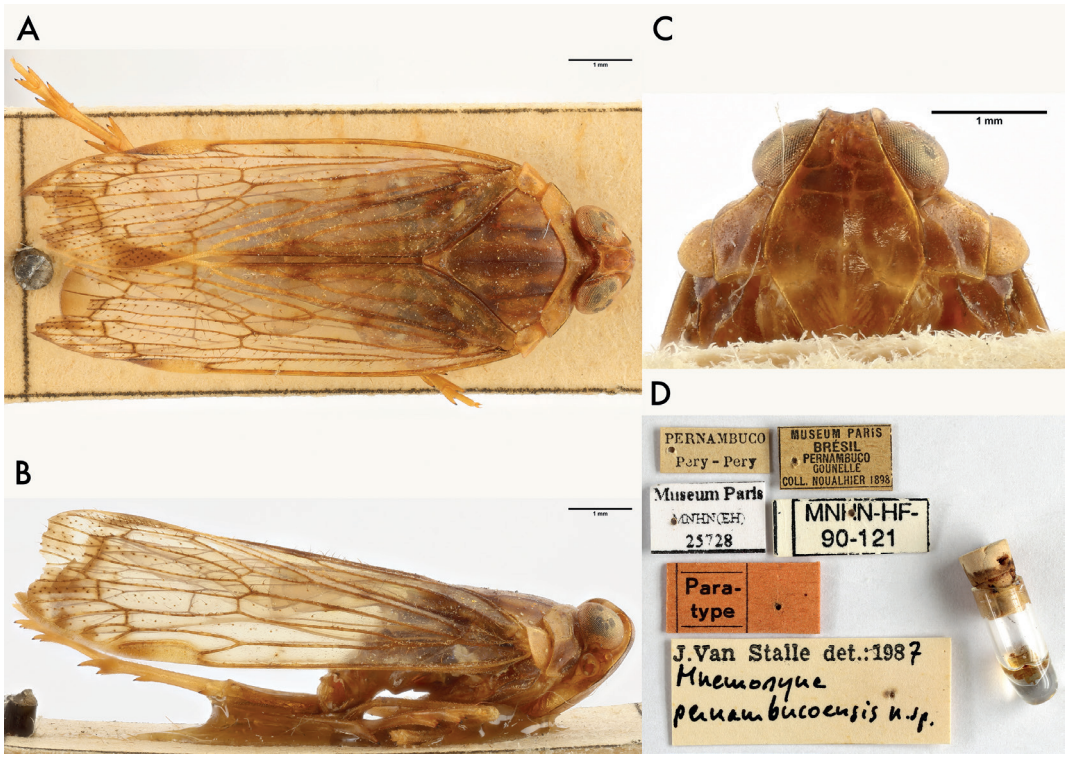

Figure 6. *Mnemosyne pernambucoensis* Van Stalle (paratype, male); **A)** dorsal habitus; **B)** lateral habitus; **C)** frontal view; **D)** labels.

female), USNM (1 male, 2 female).

Remarks. *Mnemosyne guairensis* **n. sp.** keys with some difficulty in Van Stalle (1987), but would probably key to *Mnemosyne planiceps* (Fabricius) because the overall arrangement of the anal tube and pygofer in lateral view is similar (Van Stalle 1987, figs. 63, 64), but the form of the medioventral lobe (Van Stalle 1987, fig. 65), is quite different; in *M. guairensis* **n. sp.**, the apex of the medioventral lobe is broad and cordate (Fig. 3A), whereas it is narrow in *M. planiceps*. There are no other *Mnemosyne* species with a similar medioventral lobe of the pygofer and a tapering process of the anal tube.

Alternatively, the new species might key to *M. pernambucoensis* Van Stalle if the lateral margins of the pygofer were interpreted as without distinct processes viz. (Van Stalle 1987, fig. 103). *Mnemosyne pernambucoensis* is also similar (Van Stalle 1987, figs. 102-104) in having the apex of medioventral process of the pygofer bifurcate; aedeagus bearing a long spine on the base and a curled apex with several spines; and an anal tube armed with a long apical process. *Mnemosyne pernambucoensis* differs from *M. guairensis* **n. sp.** in the shape of the medioventral process (apex angulately bifid in *M. pernambucoensis*, Van Stalle 1987, fig. 104, versus cordate in *M. guairensis* **n. sp.,** Fig. 3A), and the aedeagus of *M. guairensis* **n. sp.** lacks the two elongate basal processes (Van Stalle 1987, fig. 102), but instead has inversely curved processes, appearing as spherical lobes (Figs 5C, 5D, 5F). Superficially *M. pernambucoensis* (Fig. 6) appears to be a paler species than *M. guairensis* **n. sp.** (Fig. 1) with a paler pronotum than mesonotum (concolorous in *M. guairensis* **n. sp.**, Fig. 1A), but with otherwise similar markings. The apex of the head of *M. guairensis* **n. sp.,** (Fig. 1B) appears to be projected slightly more than that of *M. pernambucoensis* (Fig. 6B).

Other Material Examined. *Mnemosyne pernambucoensis* Van Stalle, 1987 (paratype, male). "Pernambuco / Pery-Pery // Museum Paris / Brésil / Pernambuco / Gounelle / Coll. Noualhier 1898 // Museum Paris / MNHN(EH) / 25728 // MNHN-HF-90-121 // Para- / type // J. Van Stalle det.: 1987 / Mnemosyne / pernambucoensis n. sp."

Discussion

The Mnemosynini have proven to be a difficult group to classify. First separated from the Pentastirini as a subtribe by Emeljanov (1992: 25), Szwedo recognized them as a tribe in 2004. In 2008, a molecular analysis placed them as a sister group of the Pentastirini (Ceotto et al. 2008), while a phylogeny on a morphological basis (Ceotto & Bourgoin 2008), places them in the sister group of (Oecleini + (Stenophlepsiini + (Bothriocerini + Borysthenini))), independent of the Pentastirini clade. Based on previous classifications, Luo et al. (2021) classify them *a priori* in the Pentastirinian lineage. However, in a recent comprehensive molecular phylogenetic analysis covering 126 cixiid taxa, Mnemosynini were recovered as the sister group of (Oecleini + Bothriocerini), independent of the (Borysthenini + Pentastirini) clade (Bucher et al. 2023, fig. 3). Although this result looks to conform with the morphological analysis of Ceotto & Bourgoin (2008), the authors pointed out that only one taxon was sequenced to represent the tribe and that this sampling remains insufficient to confirm this result.

New World *Mnemosyne* are distributed in the Greater Antilles, southern Mesoamerica, and tropical South America (Fig. 7). Van Stalle (1987) noted several features that appear to divide the New World taxa into continental and Caribbean groups. These informal groups should be further studied to determine whether they should be segregated at the genus level, as well as whether the Old World taxa should be considered congeneric with *Mnemosyne* from the New World.

The biology of *Mnemosyne* appears largely unknown, although Myers (1929) gave a detailed account of cixiid nymphs associated with ants (cryptobiotic trophobiosis, Bourgoin et al.

Figure 7. Distribution of *Mnemosyne* in the New World; symbols indicating data source: **circle** = Tritrophic TCN, **triangle** = iNaturalist, **square** = iDigBio.

2023) in decayed wood with rootlets, some of which were successfully reared and determined to be *Mnemosyne cubana* Stål, 1866. Adults of *Mnemosyne* appear to often rest, and possibly feed, on the bark of trees as supported by collection records and iNaturalist observations.

Mnemosyne guairensis **n. sp**. represents the 24th species in the genus from the New World and the first species in the genus to be described from Paraguay. The diagnostic taxonomy of the described New World *Mnemosyne* appears well-resolved by Van Stalle (1987), although there may be many more species to be described (as noted by Van Stalle 1987). Within the studied *Mnemosyne* specimens from Paraguay, there was a single female that was smaller than *Mnemosyne guairensis* **n. sp**. which appears to represent a second species from Paraguay. Additionally, we have examined specimens from other locations that may also represent new taxa. Based on available specimens and *Mnemosyne* images on iNaturalist, it appears that many of the New World taxa could be diagnosed based on superficial features, without recourse to male terminalia, if more images of authoritatively identified taxa were made available.

Acknowledgements

Collecting and export permits (for John Leavengood) were facilitated by Luis Morán (Museum Director), John Kochalka (Chief of the Invertebrates Section), and Dr. Bolívar R. Garcete-Barrett (Curator of Entomology) from the Museo Nacional de Historia Natural del Paraguay (San Lorenzo, Paraguay). Thanks to Meredith June Willmott and Kimberley J. Shropshire for the illustrations in this work. We thank Adeline Soulier and Laurent Fauvre (Museum National d'Histoire Naturelle, Paris, France) for photographs of *Mnemosyne pernambucoensis*. We thank the University of Delaware College of Agriculture and Natural Resources and the Department of Entomology and Wildlife Ecology for undergraduate research support and additional support from USDA SCRI (award number 2019-51181-30014).

Literature

Arthropod Easy Capture. (2013). *Arthropod Easy Capture*, Version 1.34. <https://sourceforge.net/projects/arthropodeasy>.

Bourgoin, T. (1988). A new interpretation of the homologies of the Hemiptera male genitalia illustrated by the Tettigometridae (Hemiptera, Fulgoromorpha). Pp. 113–120, *in* Vidano, C. & Arzone, A. (Eds.). *Proceedings of the 6th Auchenorrhyncha Meeting, Turin, Italy, 7–11 September 1987*. Rome: Consiglio Nazionale delle Ricerche. 652 pp.

Bourgoin, T. (2023). *FLOW (Fulgoromorpha Lists on The Web): a world knowledge base dedicated to Fulgoromorpha*. Version 8 (Updated: 18.i.2023). [Consulted: 18.i.2023]. <https://flow.hemiptera-databases.org/flow/>.

Bourgoin, T. & Huang, J. (1990). Morphologie comparé des genitalia mâles des Trypetimorphini et remarques phylogénétiques (Hemiptera: Fulgoromorpha: Tropiduchidae). *Annales de la Société entomologique de France*, 26(4): 555–564.

Bourgoin, T., Wang, R.R., Asche, M., Hoch, H., Soulier-Perkins, A., Stroiński, A., Yap, S. & Szwedo, J. (2015). From micropterism to hyperpterism: recognition strategy and standardized homology-driven terminology of the forewing venation patterns in planthoppers (Hemiptera: Fulgoromorpha). *Zoomorphology*, 134(1): 63–77. <https://doi.org/10.1007/s00435-014-0243-6>.

Bucher, M., Condamine, F. L., Luo, Y., Wang, M., & Bourgoin, T. (2023). Phylogeny and diversification of planthoppers (Hemiptera: Fulgoromorpha) based on a comprehensive molecular dataset and large taxon sampling. *Molecular Phylogenetics and Evolution,* 186(107862). <https://doi.org/10.1016/j.ympev.2023.107862>.

Bourgoin, T., Gjonov, I., Lapeva-Gjonova, A., Roger, S., Constant, J., Kunz, G., & Wilson, M.R. (2023). When cockroaches replace ants in trophobiosis: a new major life-trait pattern of Hemiptera planthoppers behaviour disclosed when synthesizing photographic data. *Diversity*, 15(356): 1–69. <https://doi.org/10.3390/d15030356>

Ceotto, P. C. & Bourgoin, T. (2008). Insights into the phylogenetic relationships within Cixiidae (Hemiptera: Fulgoromorpha): cladistic analysis of a morphological data set. *Systematic Entomology,* 33(3): 484–500. <https://doi.org/10.1111/j.1365-3113.2008.00426.x>.

Ceotto, P. C., Kergoat, G.J., Rasplus, J.-Y. & Bourgoin, T. (2008). Molecular phylogenetics of cixiid planthoppers (Hemiptera: Fulgoromorpha): New insights from combined analyses of mitochondrial and nuclear genes. *Molecular Phylogenetics and Evolution,* 48(2): 667–678. <https://doi.org/10.1016/j.ympev.2008.04.026>.

Dmitriev, D.A. (2022). Etymology and grammatical gender of generic names in Auchenorrhyncha (Hemiptera). *Illinois Natural History Survey Bulletin,* 43(2022001), 1–224. <https://doi.org/10.21900/j.inhs.v43.837>.

Emeljanov, A.F. (1971). New genera of leafhoppers of the families Cixiidae and Issidae (Homoptera, Auchenorrhyncha) in the USSR. *Entomologicheskoe Obozrenie,* 50(3): 619–627.

Emeljanov, A.F. (1992). Planthoppers of the family Cixiidae from the vicinity of Ambo, Ethiopia (Homoptera, Cicadina). *Zoosystematica Rossica,* 1(1): 20–36.

Hendrix, S.V. & Bartlett, C.R. (in press). On the genus-level placement of *Oliarus beebei* Metcalf 1945 (Hemiptera: Cixiidae). *Entomological News*, (2024) 131(1).

Holzinger, W.E., Emeljanov, A.F. & Kammerlander, I. (2002). The family Cixiidae Spinola 1839 (Hemiptera: Fulgoromorpha) - a review. *Denisia*, 4: 113–138.

Löcker, B., Fletcher, M.J., & Gurr, G.M. (2006). First record of the planthopper tribe Mnemosynini in Australia with the description of two new species (Hemiptera: Fulgoromorpha: Cixiidae). *Russian Entomological Journal,* 15(3): 287–294.

Luo, Y., Bourgoin, T., Szwedo, J., & Feng, J.-N. (2021). Acrotiarini trib. nov., in the Cixiidae (Insecta, Hemiptera, Fulgoromorpha) from mid-Cretaceous amber of northern Myanmar, with new insights in the classification of the family. *Cretaceous Research,* 128(104959). <https://doi.org/10.1016/j.cretres.2021.104959>.

Metcalf, Z.P. (1938). The Fulgorina of Barro Colorado and other parts of Panama. *Bulletin of the Museum of Comparative Zoology at Harvard College,* 83(5): 277–423.

Metcalf, Z.P. (1945). Fulgoroidea (Homoptera) of Kartabo, Bartica District, British Guiana. *Zoologica [Scientific contributions of the New York Zoological Society],* 30(3): 125–143.

Myers J.G. (1929). Observation on the biology of two remarkable cixiid plant-hoppers (Homoptera) from Cuba. *Psyche,* 36(4): 283–292.

Schuh, R.T. (2012). Integrating specimen databases and revisionary systematics. *ZooKeys*, 209: 255–267. <https://doi.org/10.3897/zookeys.209.3288>.

Schuh, R.T., Hewson-Smith, S. & Ascher, J.S. (2010). Specimen databases: A case study in entomology using web-based software. *American Entomologist,* 56(4): 206–216. <https://doi.org/10.1093/ae/56.4.206>.

Shorthouse, D.P. (2010). *SimpleMappr, an online tool to produce publication-quality point maps*. [Consulted: 16.i.2024]. <https://www.simplemappr.net>.

Spinola, M. (1839). Essai sur les Fulgorelles, sous-tribu des Cicadaires, ordre des Rhyngotes. *Annales de la Société Entomologique de France*, 8: 133–337 + 450–454 + pls. 10–17.

Stål, C. (1866a). Hemiptera Homoptera Latr. *Hemiptera Africana.* Tomus 4. Holmiae: Officina Norstedtiana. 276 pp + 1 pl.

Stål, C. (1866b). Analecta Hemipterologica (Continuatio.). *Berliner Entomologische Zeitschrift,* 10(4): 381–394.

Szwedo, J. (2004). *Autrimpus sambiorum* gen. and sp. nov. from Eocene Baltic amber and notes on Mnemosynini stat. nov. (Hemiptera: Fulgoroidea: Cixiidae). *Annales Zoologici,* 54(3): 567–578.

Szwedo, J., T. Bourgoin, T. & Lefebvre, F. (2006). New Mnemosynini taxa (Hemiptera, Fulgoromorpha: Cixiidae) from the Palaeogene of France with notes on their early association with host plants. *Zootaxa,* 1122(1): 25–45. <https://doi.org/10.11646/zootaxa.1122.1.2>.

Szwedo, J., Drohojowska, J., Popov, Y., Simon, E. & Wegierek, P. (2019). Aphids, true hoppers, jumping plant-lice, scale insects, true bugs and whiteflies (Insecta: Hemiptera) from the Insect Limestone (latest Eocene) of the Isle of Wight, UK. *Earth and Environmental Science Transactions of The Royal Society of Edinburgh*, 110(3-4): 331–396. <https://doi.org/10.1017/S175569101900001X>.

Van Stalle, J. (1985). A review of the Afrotropical species of the genus *Mnemosyne* Stål (Homoptera, Fulgoroidea, Cixiidae). *Annales de la Société Entomologique de France,* 21(4): 399–405.

Van Stalle, J. (1987). A revision of the Neotropical species of the genus *Mnemosyne* Stål, 1866 (Homoptera, Cixiidae). *Bulletin de l'Institut Royal des Sciences Naturelles de Belgique Entomologie*, 57: 121–139.

Van Stalle, J. (1988). Revision of the Oriental species of *Mnemosyne* Stål, 1866 (Homoptera, Cixiidae). *Annales Entomologici Fennici,* 54(2): 33–47.