

ORIGINAL ARTICLE

## ***Villala* Goemans and O'Brien, a new genus of Fulgoridae (Hemiptera, Fulgoromorpha) with three new species from Mexico, Belize, Guatemala, Honduras, and Costa Rica**

GEERT GOEMANS<sup>1</sup> & LOIS B. O'BRIEN<sup>2</sup>

<sup>1</sup>Collaborator at The Royal Belgian Institute of Natural Sciences, Brussels, Belgium, <sup>2</sup>Center for Biological Control, Florida A. and M. University, Tallahassee, Florida, USA

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### **Abstract**

A new genus of Fulgoridae, *Villala*, with a long head projection, is described with three new species: *V. canoi* Goemans from Guatemala, Costa Rica, Belize, and Honduras; *V. angelica* O'Brien from Costa Rica, and *V. platyrhina* O'Brien from Mexico. A key to the species and comparative notes are included.

### **Resumen**

Se describe un género nuevo de Fulgoridae, *Villala*, que tiene una proyección alargada de la cabeza, con tres especies nuevas: *V. canoi* Goemans de Guatemala, Costa Rica, Belice y Honduras; *V. angelica* O'Brien de Costa Rica y *V. platyrhina* O'Brien de México. Se incluye una clave para las especies y notas comparativas.

**Keywords:** *Villala*, Central America, behavior, Homoptera, Auchenorrhyncha, Fulgoroidea

### **Introduction**

A new genus and three new species of lanternflies, Fulgoridae, from Central America are here described. In O'Brien (1988), this new genus keys near *Artacie*, *Enchophora*, and *Copidocephala*, but differs by features presented in the description.

Morphological terminology follows O'Brien (1988). The collection codens are those of the list on the Bishop Museum website (<http://hbs.bishopmuseum.org/codens/codens-inst.html>), which is based largely on Arnett et al. (1993), except for INBio and IBUNAM which refer to Instituto Nacional de Biodiversidad, INBC Costa Rica and Zoology Department, Institute of Biology, UNAM Mexico.

### ***Villala***

Goemans and O'Brien, gen. n. *Type species Villala canoi* Goemans

Medium sized in-sects, 19–25 mm. Head projection recurved, usually slightly flattened laterally (except

in *platyrhina*), in dorsal view with sides subparallel, 1/10 to 1/7 length of insect from base of projection to tip. Head with eyes narrower than thorax, width of vertex including supraocular flanges about 1/3 width of pronotum. Head usually raised above pronotum, area behind posterior margin of vertex exposed. Gena with preocular flange present and small. In lateral view of head, supraocular flange distinct, extending above eyes height of 1–3 ocelli; frontal disk and head projection forming obtuse angle; disk of vertex and projection forming acute angle (except in *platyrhina*); dorsal margin of projection variably curved upward, with bulge at base; dorsal lateral carinae slightly divergent anteriorly until junction of marginal carinae of frons, at which point converging dorsal lateral carinae form single median carina. Frons broadest at level of antennae, with pair of lateral median carinae on disk which become ventral margins of head projection. Head projection with ventral median carina on apical 2/3 (apical 1/2 in *platyrhina*). Frontoclypeal suture sunken, upper margin straight or biconcave. Clypeus with median carina distinct, lateral carinae strong.

Pronotum with small but distinct median carina; two lateral carinae between eye and tegula with the dorsal carina bending along the anterior margin of the pronotum to the base, dorsal lateral carina with or without triangular flange behind supraocular lobes of vertex (Figures 6, 7). Mesonotum with heart-shaped flattened deep brown very shallow depression on apex of disk, laterally bordered by carinae. Tegmen with clavus open, anterior crossveins reticulate; membrane with crossveins forming rectangular cells, brown small hairs on longitudinal veins. Hind wings with hairs along margin and on underside. Females have clumps of white wax on the 8th and 9th abdominal tergites.

*Color.* Body and tegmen brown or reddish brown, mottled with minute red dots except hind wings and abdomen. Hind wings brown at apex and along posterior margin, basal portion red or light brown, white spots in apical 1/3 and at junction of two colors. Abdomen red above, apex brown or red, venter pale brown with darker brown spots, lateral margins brown. Legs brown mottled with pale brown, with indistinct red dots; fore and mid tibiae with two transverse pale irregular bands. Ventral lateral carinae of head projection with three or more black spots (Figures 3–5). Supraocular flange with black irregular spot (Figures 6–8).

In O'Brien (1988), *Villala* would key to couplet seven because the tegmen is opaque, the hind wings have no eye-spot, the head process is curved upwards (although not backwards). But to include *Villala*, we must modify the key and add one couplet. *Villala*, like *Artacie*, has a preocular horizontal flange between the eye and the junction of the frons and vertex, but differs in lacking the head process recurved and addressed to the vertex. So couplet 7 should be replaced with 7 and 7B as follows:

7(6). Preocular horizontal flange between eye and junction of frons and vertex ..... 7B  
 — Preocular horizontal flange absent ..... 8  
 7B(7). Head process recurved and addressed to vertex ..... *Artacie*  
 Head process extending before head about equal to length of head, slightly or strongly curved upward ..... *Villala*

The two other genera that might be confused with *Villala*, *Enchophora* and *Copidocephala*, lack the preocular horizontal flange and have head processes that usually are curved so that the apex is vertical or angled backward. *Villala* also lacks *Enchophora*'s characteristic swollen median pronotal carina with top reaching the level of the head and deep lateral fossettes on each side.

This genus resembles *Aphrodisias* and *Simuala* in general color pattern, but can easily be separated

from both by having the head projection recurved and not porrect, as the latter two do.

#### *Etymology*

This name is a combination of the Latin nouns *villus* for hair and *ala* for wing.

#### **Key to the species of *Villala***

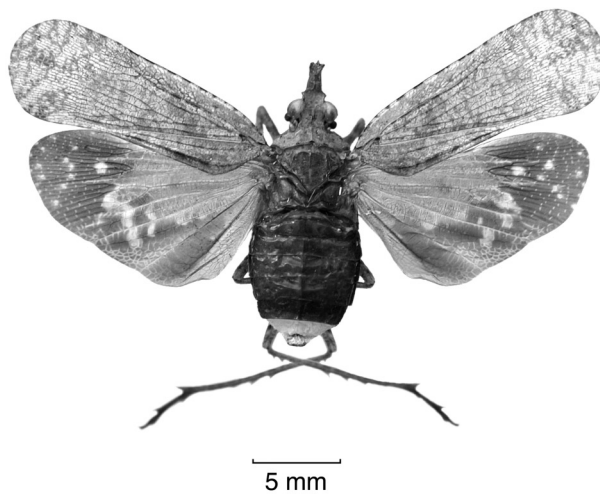
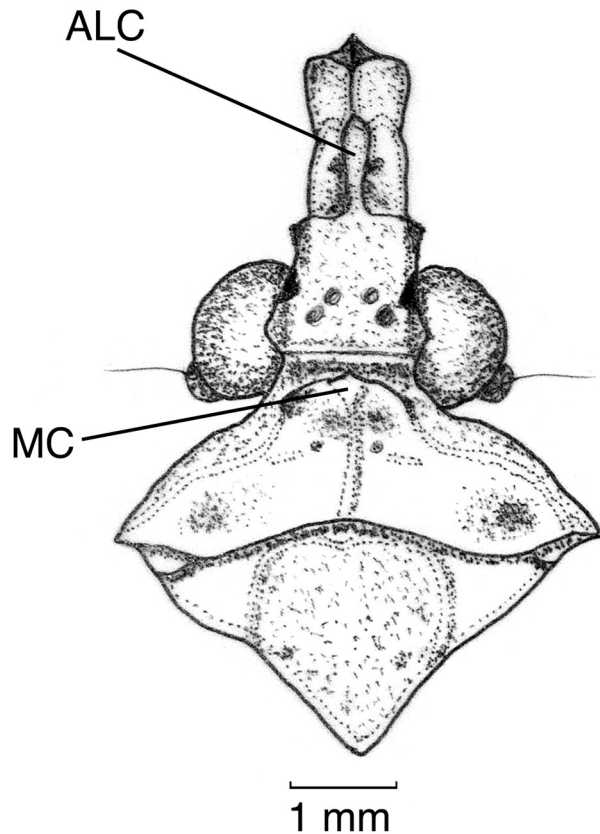
1. Head projection dorso-ventrally flattened apically (Figures 5, 8); transverse median carina on vertex; head projection in dorsal view with area between lateral carinae wider than either side; no flange on pronotum behind eye; frons and ventral base of head projection dark brown, contrasting with pale apex ..... *V. platyrhina* O'Brien, sp. n.
- Head projection not dorso-ventrally flattened apically; frons with pale circular spots in front of antennae (Figures 3, 4, 6, 7); head projection in dorsal view with area between lateral carinae narrower than either side (Figure 1); flange on pronotum behind eye; frons not as above, mottled ..... 2
2. Apex of flange on anterior carina of pronotum in lateral view exceeding top of eye (Figure 6); height of supraocular flange on vertex about half height of eye (Figure 6) ..... *V. angelica* O'Brien, sp. n.
- Apex of flange on anterior carina of pronotum in lateral view not exceeding top of eye; height of supraocular flange on vertex less than 1/3 height of eye (Figure 7) ..... *V. canoi* Goemans, sp. n.

#### *Villala canoi*

Goemans sp. n. (Figures 1,2,4,7).

*Length*—Male 20 mm, female 21–23 mm. In lateral view, supraocular flanges on vertex about 2 x width of ocellus; pronotum with flanges on dorsal lateral marginal carina at base behind supraocular lobes of vertex about width of ocellus; head projection in lateral view about equal width throughout, with an indentation near the middle (Figure 7). Head projection of vertex with area between dorsal lateral carinae narrower than area on sides in dorsal view (Figure 1). Ventral median carina in apical 2/3 of projection (Figure 4).

*Male genitalia.* Pygofer in lateral view inclined with dorsal margin toward rear, broader at venter, measured horizontally and vertically 5/6 as tall as long; posterior margin with indentation near middle, slight projection bent internally just above claspers which may help hold them in place. Anal flap



Figures 1–2. *Villala canoi*: 1, dorsal view of head and thorax; 2, dorsal view of insect. Abbreviations: ALC = area between lateral carinae, MC = median carina of pronotum.

extending as far as claspers, dorsal and ventral margin straight, expanded behind; width at apex about 2/3 length; apical margin with short convex projection where dorsum and venter meet. Eleventh segment extending fingerlike from inside venter, about half as long as 10th segment. Aedeagus extending nearly to same length, broader apically. Lateral and dorsal lobes membranous, inflatable, about same length when not inflated; two appendages similar in

appearance to aedeagal appendages in achilids visible in central area from suspensorium to near tip. Claspers mitten-shaped except “thumb” is a spine curved outward and downward, with an unpigmented area between “thumb” and “hand”; hairy mound on dorsal surface behind spine.

In dorsal view, 10th segment with sides gently curved, expanded behind, dorsal apical margin indented medially and with slight rounded projection at each side. From ventral view, ventral margin concave, allowing dorsal margin to be seen from below. Male genitalia from Belize and Costa Rica (20 km. S. Upala) were compared and are the same.

*Color.* Pronotum and dorsal head brown or pale brown, mottled with many small red and few slightly larger brown spots. Venter of head brown with paler and darker brown spots and small red dots. Mesothorax dark brown, legs mottled with white or pale spots. Base of hindwings red, apex and posterior margin brown, brown areas with white spots. Posterior claval vein with irregular dark spots near middle (sometimes faint). Abdomen red dorsally with apex blackish; venter with edges dark brown, inner part pale brown mottled with dark spots, with brown tubercles.

#### Comparative notes

This species may be distinguished from *V. angelica* by the smaller flanges than *angelica* on both the vertex and the pronotum and head projection about equal width throughout with an indentation in middle and rapid narrowing at apex, as opposed to gradually narrowing throughout in *angelica*. It may be separated from *V. platyrhina*, which has even smaller flanges, by the broader, dorsoventrally flattened head projection of *platyrhina*.

#### Specimens examined

*Holotype.* (♂) **Belize**, Orange Walk [District], Rio Bravo Cons.[ervation] Area, Well Trail, 9 September, 1996, C.W. & L.B. O’Brien (CAS).

*Paratypes.* **Belize:** (1 ♂, 1 ♀), O.[range] W.[alk] Dist.[rict] Rio Bravo Cons.[ervation] Area, 17 July, 1996, Lagunitas Trail night, C.W. & L.B. O’Brien (LBOB); (2 ♂♂), same data except 20 July, 1996, one (LBOB), one (GGCB) [G. Goemans collection, Belgium]. **Costa Rica:** [Province] Alajuela: (1 ♂), 20 km. S. Upala, 14–17 August, 1990, F.D. Parker (EMUS). Province Guanacaste, (1 ♀), P[arque] N[acional] Guanacaste, Est[acion] Pitilla, 700m, 9 km.S. Sta. Cecilia, 2–9, March 1992, C. Moraga, L-N330200, 380200, INBioCR1000 425090. Province Limon, Est. Hitoy Cerere, 100m, R.Cerere, Res.[erva] Biol.[ogica] Hitoy Cerere,

20 June to 30 July, 1992 [sic], F.A. Quesada, L.N 184200,643300, (1 ♂), INBio CR1000 769743, (1 ♀), INBio Cr1000 769742.(LBOB) same except 20 May–6 June, 1993, G.Carballo, (1 ♂), INBio CR1001 161966; same except July to September, 1992, T[ram]p[a] Malaise., (1 ♀), INBio CR 1001 193999. **Guatemala:** (1 ♂), Alta Verapaz, Santa Lucía Lachuá (Laguna Lachuá), 27 V 2001, Luz UV, Bosque tropical, área perturbada, Col. C.Avendaño (GGCB). All other specimens Izabal, Sto Tomás, Cerro S[a]n.Gil, with following additional information (1 ♀), 9-V-1998, J.Ponciano (ISNB); (1 ♀), Carboneras. 400msnm. 1 June, 1999. Bosque tropical. Colectado en la noche. Col: G. Goemans (GGCB); same except (1 ♀), estación biol.[ogico] 6 June, 1999. Trampa de luz incandescente y UV (UVGC); same except (1 ♂), camping [area in park]. 450 msnm. 11 April, 1999. Bosque tropical. Colectado en el día. (GGCB). **Honduras:** (1 ♀), Puerto Castilla, 21 July 1926, R.H. Painter (OSU). (1 ♂), Ceiba, Curla, Col. Rivera W. (LBOB)

#### *Etymology*

I name this species in honor of Enio Cano from the systematics department from the Universidad del Valle in Guatemala who was a great help and support to me, and who encouraged me strongly to write this paper.

#### *Biological notes*

In Belize, two specimens of a group of three or four about 7 feet up on an unknown small tree along the edge of a trail in the Rio Bravo Conservation Area were collected. Three days later another specimen was seen at roughly the same spot on the tree and was watched before it was collected. It apparently was feeding, because at intervals of a minute it flicked its wings upward and squirted honeydew in a stream away from the tree. After several minutes it stopped for a few minutes and an ant walked toward it, stopped, walked backward, turned at an angle and walked forward the same distance, about two inches, from the insect, then walked away. Since some Fulgoroidea, especially Tettigometridae but also Caliscelidae and some Issidae, have been reported to be tended by ants, we wondered if the scent of the honeydew attracted the ant. But it stopped as though there were a wall between it and the insect.

#### *Villala angelica*

O'Brien, sp. n. (Figs. 3,6)

*Length*—Male 22 mm. In lateral view, supraocular flanges on vertex about 4 x width of ocellus; pronotum with flanges on dorsal lateral marginal carina at base,

behind supraocular lobes of vertex about 3 x width of ocellus, exceeding top of eye; head projection in lateral view about equal width throughout, tapering towards the tip (Figure 6). Head projection of vertex with area between dorsal lateral carinae narrower than area on sides in dorsal view (as in Figure 1). Ventral median carina in apical 2/3 of projection (Figure 3).

*Color:* Head and thorax brown, mottled with many small red and few slightly larger red or white or darker brown spots. Base of hindwings red, apex and posterior margin brown, brown areas with white spots similar to canoi. Posterior claval vein with four even brown and four light green spots. Abdomen reddish with red spots dorsally with apex blackish, venter yellowish with brown spots.

#### *Comparative notes*

This species is distinct because of the high flanges on the pronotum. It shares the narrow dorsal disk of the head projection with *V. canoi* and lacks the dorso-ventrally flattened head projection of *platyrhina*.

#### *Specimens examined*

*Holotype.* (♂) **Costa Rica**, Puntarenas, Peninsula de Osa, Rancho Quemado, 200m. F. Quesada, 21 March–7 April, 1992, L-S 292500, 511000, INBio bar code CR1000 412698 (INBio).

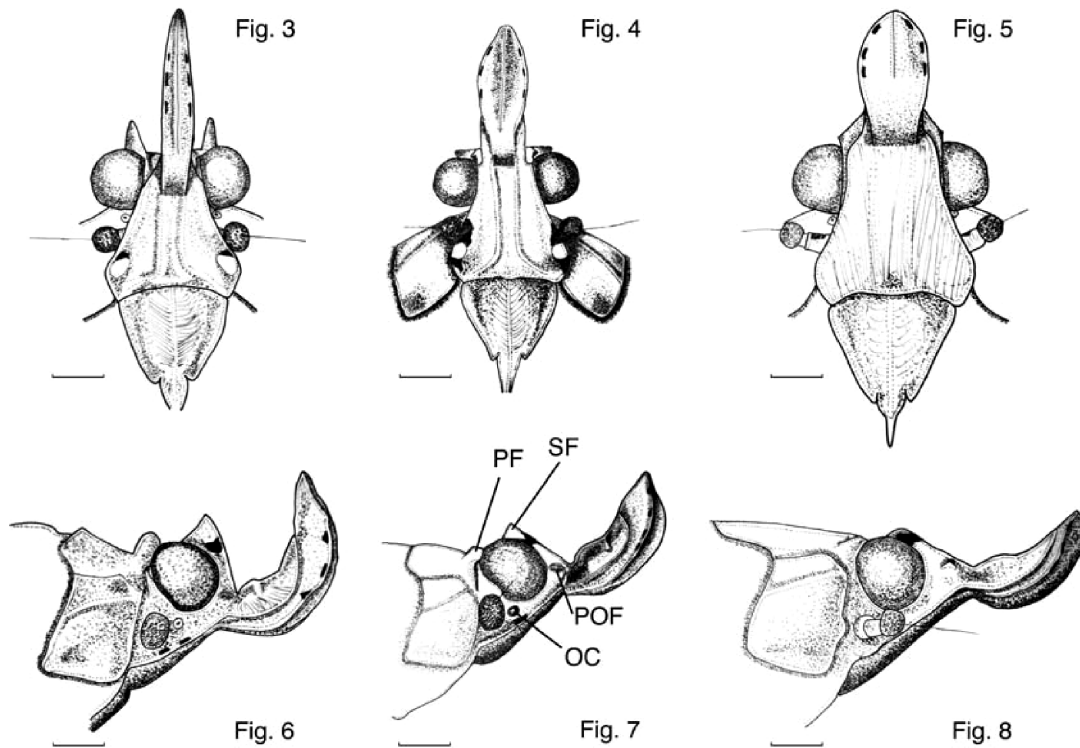
#### *Etymology*

This species is named *angelica*, a Latin adjective meaning angelic, because the position of the lobes on the pronotum remind us of angel's wings.

#### *Villala platyrhina*

O'Brien, sp. n. (Figures 5,8)

*Length*—Female 23–25 mm. In lateral view supraocular flanges on vertex about width of ocellus; pronotum with dorsal lateral marginal carina distinct, but without distinct flanges; head projection in lateral view with hump at base, narrowing anterad (Figure. 8). Vertex about as long as wide (including supraocular flanges), an apparent transverse carina before middle. In dorsal view head projection with sides converging in front of eyes; then subparallel, diverging slightly until converging at apex; dorsal carinae subparallel, area between them wider than either side until converging at junction of marginal carinae of frons to form short median carina. Projection dorsoventrally flattened. Frons rugose, lateral carinae indistinct, lacking pale circular spots in front of antennae. Ventral median carina in apical half of projection (Figure 5).



Figures 3–8. Head, frontoventral (3–5) and lateral (6–8) view: Figure 3, 6 *V. angelica*; Figure 4 7 *V. canoi*; Figure 5, 8 *V. platyrhina*. The scale bar is 1 mm. Abbreviations: OC = ocellus, PF = pronotal flange/lobe, POF = preocular flange, SF = supraocular flange.

*Color:* Frons and basal half of head projection dark brown, frons with pale marginal carinae. Rest of head and thorax brown, mottled with many white spots and small red dots. Hind wings light brown with pale areas along veins at base (faded to gray in holotype), slightly darker at apex and posterior margins, these with some distinct white crossveins and spots. Hind tibia with one pale band near base. Abdomen red dorsally, faded in holotype; venter yellowish brown with brown spots.

#### Comparative notes

This species may be easily separated from the other two by the flattened head, the wider dorsal disk on the head projection, the dark brown frons with the tip of the head projection paler, and the smaller lobes on the head and pronotum.

#### Specimens examined

*Holotype.* (♀) **Mexico**, Jalisco, Chamela, 7 June, 1985. R. Ayala (IBUNAM).

*Paratypes.* **Mexico:** (1 ♀), Jalisco, Chamela, Est[acion] de Biología Chamela, 20 July, 1997 (EMEC (formerly CIS)); (1 ♀) Jalisco, Est. Biol. Chamela, 14–29 January, 2003, Panel Tramp [sic], P.A. Noguera (LBOB).

#### Etymology

This species name is composed of the Greek words *platys* meaning flat and *rhina* meaning nose.

#### Acknowledgments

We would like to thank Carolina Godoy of INBio, Costa Rica; Dr. Jack Schuster and Dr. Enio Cano of the Universidad del Valle, Guatemala (UVGC); Dr. Wilford Hanson of Utah State University, Logan, USA (EMUS); Cheryl Barr of the Essig Museum of Entomology, University of California, Berkeley, USA (EMEC); Dr. Norman Johnson of Ohio State University (OSU), Dr. Ricardo Ayala, Chamela Biological Station, Chamela, Jalisco, and Dr. Alphonso Garcia Aldrete, Zoology Department, Institute of Biology, UNAM, (IBUNAM), Mexico for arranging loans of specimens. We also would like to thank Yves Deploige for the layout of the figures, and Dr. Charles Bartlett for his constructive reviewing comments.

#### Reference

- O'Brien LB. 1988. New World Fulgoridae, Part 1: Genera with elongate head processes. *Great Basin Naturalist Memoirs* 12:135–170.