

## A New Subfamily of the Planthopper Family Ricaniidae Amyot et Serville (Homoptera, Fulgoroidea)

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**Abstract**—Pharsalinae subfam. n. is erected in the family Ricaniidae Amyot et Serville for two monotypical genera *Pharsalus* Melichar, 1906 and *Silvanana* Metcalf, 1947 distributed in South America. The members of the new subfamily are characterized by the submacroptery, simple radius and anterior cubitus of the fore wing, the style capitulum bearing a lateral tooth, and the subrectangular (in lateral view) gonopods with partly separated third lobes and without marginal teeth. *Pharsalus repandus* Melichar, 1906 is recorded from Uruguay for the first time.

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The family Ricaniidae Amyot et Serville, 1843 includes approximately 400 species belonging to 40 genera mainly distributed in the tropics and subtropics of the eastern hemisphere (Xu et al., 2006). Four recent genera are known from South and Central America: *Cotrades* Walker, 1858; *Kruegeria* Schmidt, 1911; *Ricanula* Melichar, 1898, and *Semestra* Jacobi, 1916 (Metcalf, 1955; Fennah, 1968, 1982). The paleogene genus *Cotradechites* Fennah, 1968 established in the family Ricaniidae was transferred by Shcherbakov (2006) to the family Nogodinidae. The representatives of the family Ricaniidae are planthoppers possessing the 2nd segment of the hind tarsus short and lacking spines. In addition to Ricaniidae, this group includes the families Lophopidae, Eurybrachyidae, Gengidae, and Hypochthonellidae, and some representatives of the tribe Augilini Baker of the family Caliscelidae. All the groups listed, except for the families Ricaniidae and Lophopidae, occur only in the eastern hemisphere. Lophopidae is known from the Neotropical Region by one genus, *Carrionia* Muir, 1931 (= *Ucayalia* Fennah, 1944) with 3 species (O'Brien, 1987), while the other 36 genera are mainly distributed in the Oriental and Australian Regions (Soulier-Perkins, 1998). *Carrionia* is considered to be the most primitive genus in the family Lophopidae (Soulier-Perkins, 2001). The family Ricaniidae, in contrast to Lophopidae, is abundantly represented in the Afrotropical Region, including Madagascar, the Seychelles, and the Mascarene Islands. The current distribution of the family Ricaniidae in America can be accounted for if we assume Soulier-Perkins's (2000) hypothesis, according to which, Lophopidae has passed from Asia to

North America through the Beringiiskii Isthmus, and later, to South America through the Isthmus of Panama.

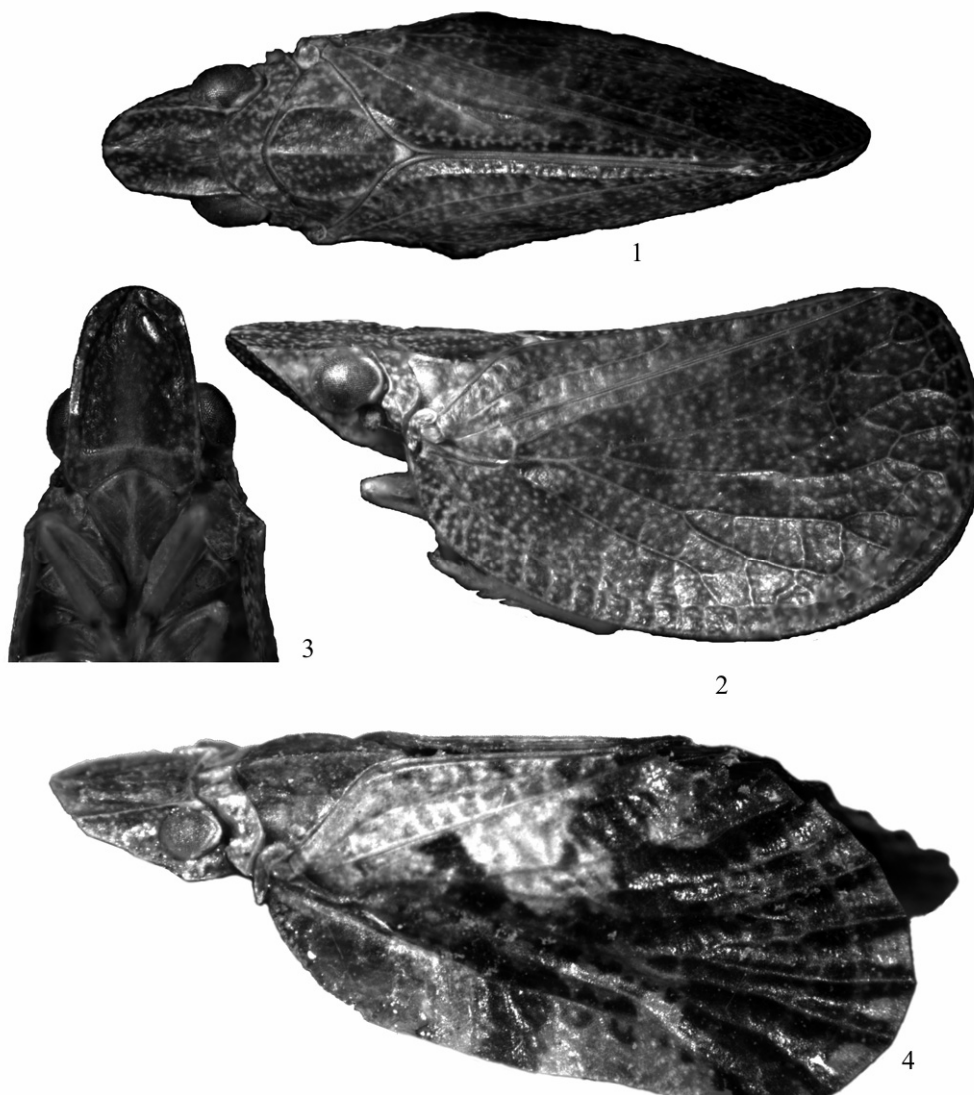
The material examined is deposited in the collection of the Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia (ZIN), Viennese Natural History Museum, Vienna, Austria (NHMW), Moravian Museum, Brno, Czech Republic (MMBC), and the Museum of Insects, University of North Carolina, Raleigh, the USA (NCSU).

The morphological terminology used in the paper follows that of Emeljanov (1995) and Gnezdilov (2003). The male and female genitalia, previously macerated in alkali, were placed in glycerol jelly for subsequent drawing under a light microscope Mikmed-1. The photographs were made using a microscope Leica MZ95 with a video camera DFC290, and then processed by means of the software Helicon Focus 4.61 and Photoshop®.

No suprageneric classification of the family Ricaniidae has been developed. I suggest that Ricaniidae should be considered as a family comprising two subfamilies: nominotypical Ricaniinae (Figs. 13–17) and Pharsalinae subfam. n. (Figs. 1–12).

The subfamily Ricaniinae is characterized by the following features (after Metcalf, 1955; Shcherbakov, 1981, 1982; original data).

(1) Coryphe wide and short. Clypeus considerably narrower than metope. (2). Radius and median of fore wing and anterior cubitus of fore and hind wings usually forming many multiramose (Figs. 13, 14).

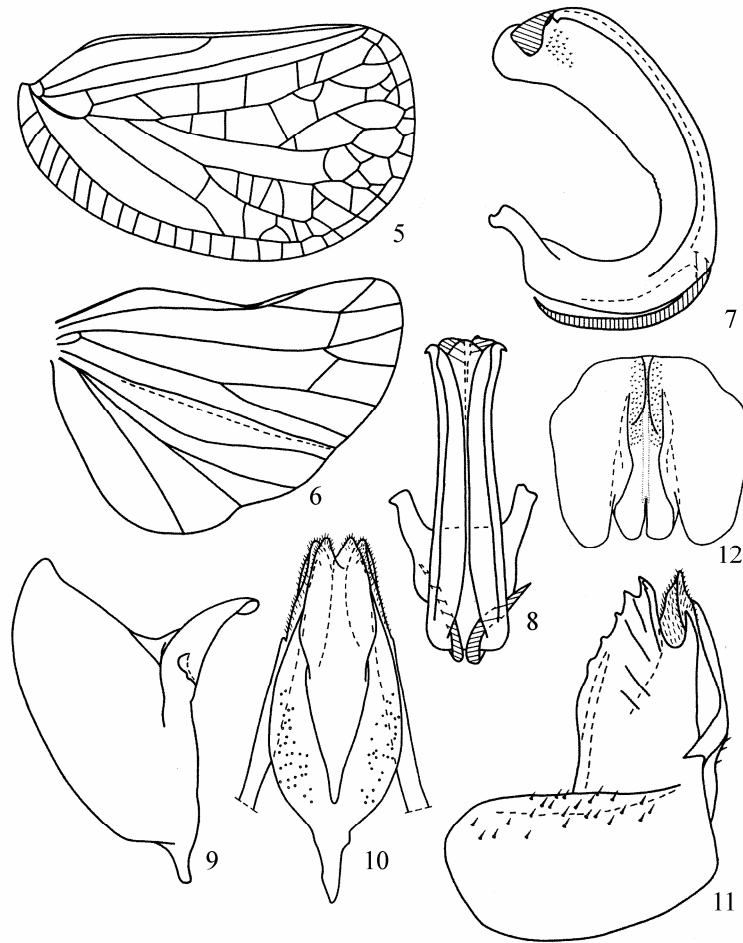


**Figs. 1–4.** Pharsalinae subfam. n.: (1–3) *Pharsalus repandus* Melichar, female (Uruguay, Rocha), general view [(1) dorsal, (2) lateral, and (3) front view]; (4) *Silvanana omani* Metcalf, paratype, general lateral view.

(3) Style with cuneiform capitulum, without lateral tooth (Fig. 15). (4) Gonoplasts widely triangular, with fused lobes, flat, usually with marginal teeth. (5) Anterior connective lamina of gonapophysis VIII narrow (Fig. 16).

The genus *Pharsalus* Melichar was established in the family Issidae Spinola for *Pharsalus repandus* Melichar, 1906 described from southern Brazil (Melichar, 1906). Later, Prates and Carvalho (2002 : figs. 4–6, 17, 22, 34–41) examined syntypes of *P. repandus* and published a paper including a detailed redescription and photographs of the male and female genitalia and figures of separate parts of the head and legs, but did not pay attention to the reduced 2nd segment of the hind tarsus. The assertion that

the genus *Pharsalus* belongs to the family Ricaniidae is substantiated by the following characters of the venation of the fore and hind wings of Ricaniidae (Shcherbakov, 1981, 1982): fore wing widely triangular, with precostal area bearing numerous cross-veins; radius running into anteroapical corner of wing; clavus closed; posteroapical angle of wing situated immediately behind apex of clavus (Figs. 2, 4, 5); anterior margin of hind wing with strong rounded projection, posterior cubital and postcubital veins not connected by cross-vein, 2nd anal vein simple (Fig. 6). Multiramose median vein of fore wing should also be noted. Posterior connective lamina of gonapophyses IX in the shape of isosceles triangle (Figs. 10, 17).



**Figs. 5–12.** *Pharsalus repandus* Melichar, Uruguay: male, Rocha (6–9) and female, Rocha (5) and Artigas (10–12): (5) fore wing; (6) hind wing; (7) penis, lateral view; (8) penis, ventral view; (9) style, lateral view; (10) posterior connective lamina of gonapophyses IX, dorsal view; (11) anterior connective lamina of gonapophysis VIII and gonocoxa VIII, lateral view; (12) gonoplacs, dorsal view.

Based on the structure of the head, pro- and mesonotum, and venation of the fore and hind wings, *Pharsalus* is closely related to the genus *Silvanana* Metcalf, 1947 (Metcalf, 1947 : figs. 1–3, 6; O'Brien, 1987 : figs 4, 5, 18) also known from southern Brazil. The genus was established in the family Lophopidae (Metcalf, 1947) for *Silvanana omani* Metcalf, 1947. However, after phylogenetic analysis of Lophopidae (Soulier-Perkins, 2001), the genus *Silvanana* was excluded from this family without clear designation of its taxonomic position among the other families of Fulgoroidea.

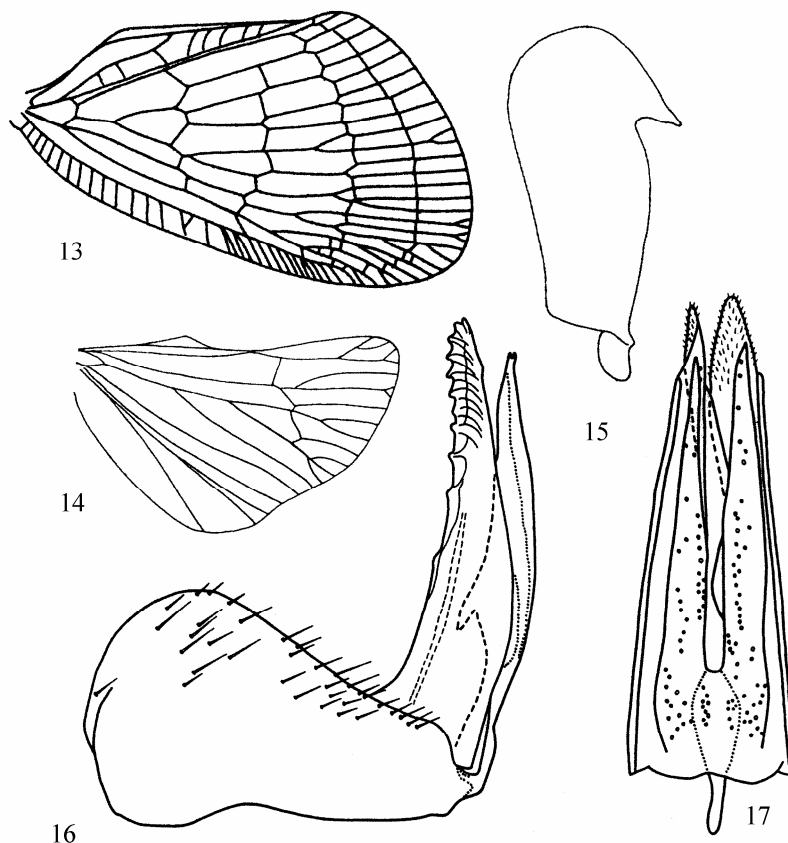
Based on a distinctive structure of the style bearing a lateral tooth, the presence of the subrectangular (in lateral view) gonoplacs without marginal teeth and with partly separated 3rd lobes, and also the presence of the simple radius and anterior cubitus of the fore wing, the genera *Pharsalus* and *Silvanana* are placed in a separate subfamily, Pharsalinae subfam. n., of the

family Ricaniidae. The taxonomic position of the other American representatives of the family Ricaniidae requires a more accurate definition.

Subfamily **PHARSALINAE** Gnezdilov, subfam. n.

Type genus *Pharsalus* Melichar, 1906.

**Diagnosis.** Metope wide and long (Fig. 3). Clypeus large, without keels; metope-clypeal suture sharp. Ocelli forming 1 pair. Pedicel spherical, with sensory organs. Coryphe wide and long, about 3 times as long as pronotum (Fig. 1), with or without weak median keel. Pronotum with median keel. Mesonotum approximately as long as coryphe, with median and lateral keels. Tegulae large, oblong, with 2 transverse ridges. Fore wing widely triangular, with precostal area bearing cross-veins (Figs. 2, 4, 5). Basal cell large. Venation of fore wing: *R* 1 *rm* 1–11 *M* 8–11 (15–21 intermedial cross-veins) *mcu* 2–5 *CuA* 1. Clavus closed, common stem of *Pcu* and *A*<sub>1</sub> not crossing



**Figs. 13–17.** Ricaniinae Amyot et Serville: (13–15) *Trysanor cicatricosus* Williams et Fennah [(13) fore wing; (14) hind wing; (15) style, lateral view]; (16, 17) *Ricania japonica* Melichar [(16) anterior connective lamina of gonapophysis VIII and gonocoxa VIII, lateral view; (17) posterior connective lamina of gonapophyses IX, dorsal view]; (13–15) after Williams and Fennah, 1980; (16, 17) after Gnezdilov, 2003).

*CuP*. Posteroapical angle of wing situated immediately behind apex of clavus. Hind wing well developed, with strong rounded projection on anterior margin (Fig. 6). Venation of hind wing: *R* 3 *rm* 1 *M* 2 *mcu* 1 *CuA* 2–4 *CuP* 1 *Pcu* 1 *A*<sub>1</sub> 2 *A*<sub>2</sub> 1. Anterior margin with connective lobe. Emarginations of wing margin separating remigium from vannus and anal lobe of vannus from its basal part. Hind tibia with 1 lateral spine distally. First metatarsomere with continuous row of 7–9 intermedial spines bearing subapical setae. Second metatarsomere small, without spines.

**Male** (Figs. 7–9). Phallobase narrow, arcuately curved (Figs. 7, 8). Aedeagus with 1 pair of long ventral hooks pointing to its base. Style with large, long capitulum without neck but bearing large lateral tooth (Fig. 9). Posterior margin of style straight, caudodorsal angle acute.

**Female** (Figs. 10–12). Posterior margin of sternite VII deeply and widely emarginate. Gonoplacs approximately rectangular (in lateral view), without teeth along margin, with fused 1st and 2nd lobes and with

partly separated 3rd lobes (Fig. 12). Posterior connective lamina of gonapophyses IX with straight distal parts (Fig. 10). Lateral fields of gonapophyses flat. Median field of gonapophyses with 1 pair of apical lobes. Bridge of gonospiculum small. Anterior connective lamina of gonapophysis VIII wide, with 3 teeth in apical group and 4 carinate teeth in lateral group, and also with 1 strong tooth at posterior margin (Fig. 11). Gonocoxa VIII wide, subrectangular, with straight posterior margin. Endogonocoxal process wide, narrowed toward bifurcate apex.

**Distribution.** Neotropical Region: Brazil, Uruguay.

**Biology.** According to Metcalf (1947), *Silvanana omani* Metcalf was collected on *Britoa acida* (Mart.) O. Berg of the family Myrtaceae.

*Pharsalus repandus* Melichar, 1906  
(Figs. 1–3, 5–12)

**Material.** Brazil: 1 ♂, 1 ♀, syntypes, “Rio Gr. do Sul, Stieglmayr” (NHMW); 1 ♂, 1 ♀, syntypes, “Rio

Gr. do Sul (MMBC). Uruguay: 1 ♂, 1 ♀, Rocha, 10 km NW Rocha, R 109, 5.II.1989, C. and L. O'Brien, G. Wibmer leg. (ZIN); 1 ♂, 1 ♀, Artigas, Bella Union, Colonia Espana, Rio Uruguay, 5 km W Ruta 3, km 620, 26.II.1989, C.S. Morey leg. (ZIN).

**Description.** Metope with ill-defined median keel extending from its apex to middle, with or without inconspicuous intermedial keels, with strong transverse keel above clypeus (Fig. 3). Clypeus arcuately running into metope.

**Male.** Anal tube elongate, with obtused apex. Anal column as long as 1/3 of anal tube. Dorsolateral lobes of phallobase long (Fig. 7). Ventral lobe of phallobase long and narrow, with rounded apex (Fig. 8). Apical processes of aedeagus widened apically, projecting beyond margin of phallobase (Fig. 7).

**Female.** Anal tube short, wide, narrowed toward apex.

*Silvanana omani* Metcalf, 1947 (Fig. 4)

**Material.** Brazil: paratype (sex not known), Bahia, Agua Preta, 13.VI.1946, on *Britoa acida*, P. Silva leg. (NCSU) (examined from photograph).

**Comparison.** *S. omani* clearly differs from *P. repandus* in the markedly goffered posterior margin of the fore wing (Fig. 4) and in the absence of transverse keel of the metope above the clypeus.

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#### REFERENCES

- Emeljanov, A.F., "On the Problem of Classification and Phylogeny of the Family Delphacidae (Homoptera, Cicadina), with the Larval Characters Taken into Account," *Entomol. Obozr.* **74** (4), 780–794 (1995).
- Fennah, R.G., "A New Genus and Species of Ricaniidae from Palaeocene Deposits in North Dakota," *J. Nat. Hist.* **2** (1), 143–146 (1968).
- Fennah, R.G., "A Tribal Classification of the Tropicuchidae (Homoptera: Fulgoroidea), with the Description of a New Species on Tea in Malaysia," *Bull. Entomol. Res.* **72** (4), 631–643 (1982).
- Gnezdilov, V.M., "A Review of the Family Issidae (Homoptera, Cicadina) of the European Fauna, with Notes on the Structure of the Ovipositor in Fulgoroid Planthoppers," in *Lectures in the Memory of N.A. Kholodkovskii* (St. Petersburg, 2003), Issue 56, Part 1, pp. 1–145.
- Melichar, L., "Monographie der Issiden (Homoptera)," *Abh. K. K. Zool.-bot. Ges. Wien.* **3** (4), 1–327 (1906).
- Metcalf, Z.P., "A New Genus of Lophopidae from Brazil (Homoptera)," *Proc. Entomol. Soc. Wash.* **49** (9), 238–240 (1947).
- Metcalf, Z.P., *General Catalogue of the Homoptera. Fasc. IV. Fulgoroidea. Part 16. Ricaniidae* (Waverly Press, Baltimore, 1955).
- O'Brien, L.B., "A Synopsis of New World Lophopidae (Homoptera, Fulgoroidea)," *Florida Entomol.* **70** (4), 493–498 (1987).
- Prates, P.H. de S. and Carvalho, G.S., "Issincos no Rio Grande do Sul (Hemiptera, Fulgoroidea, Issidae)," *Bio-ciências. Porto Alegre* **10** (1), 85–105 (2002).
- Shcherbakov, D.E., "Diagnostics of the Planthopper Families (Homoptera, Auchenorrhyncha) Based on the Wing Structure: I. Fore Wing," *Entomol. Obozr.* **60** (4), 828–843 (1981).
- Shcherbakov, D.E., "Diagnostics of the Planthopper families (Homoptera, Auchenorrhyncha) Based on the on Wing Structure: I. Hind Wing," *Entomol. Obozr.* **61** (3), 528–536 (1982).
- Shcherbakov, D.E., "The Earliest Find of Tropicuchidae (Homoptera: Auchenorrhyncha), Representing a New Tribe, from the Eocene of Green River, USA, with Notes on the Fossil Record of Higher Fulgoroidea," *Russ. Entomol. J.* **15** (3), 315–322 (2006).
- Soulier-Perkins, A., "The Lophopidae (Hemiptera: Fulgoromorpha): Description of Three New Genera and Key to the Genera of the Family," *Eur. J. Entomol.* **95** (4), 599–618 (1998).
- Soulier-Perkins, A., "A Phylogenetic and Geotectonic Scenario to Explain the Biogeography of the Lophopidae (Hemiptera, Fulgoromorpha)," *Palaeo.* **160**, 239–254 (2000).
- Soulier-Perkins, A., "The Phylogeny of the Lophopidae and the Impact of Sexual Selection and Coevolutionary Sexual Conflict," *Cladistics.* **17**, 56–78 (2001).
- Williams, J.R. and Fennah, R.G., "Ricaniidae (Hemiptera: Fulgoroidea) from Mauritius, with Description of *Trysanor cicatricosus* spec. nov., gen. nov.," *J. Entomol. Soc. Sth. Afr.* **43** (1), 7–22 (1980).
- Xu, C.Q., Liang, A.P., and Jiang, G.M., "The Genus *Euricania* Melichar (Hemiptera: Ricaniidae) from China," *Raffl. Bull. Zool.* **54** (1), 1–10 (2006).