BioOne COMPLETE

A NEW GENUS OF TROPIDUCHIDAE (HEMIPTERA: FULGOROIDEA) FROM CHINA AND VIETNAM, WITH DESCRIPTION OF EGGS

Author: Liang, Ai-Ping

Source: Florida Entomologist, 86(3) : 361-369

Published By: Florida Entomological Society

URL: https://doi.org/10.1653/0015-4040(2003)086[0361:ANGOTH]2.0.CO;2

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

Downloaded From: https://bioone.org/journals/Florida-Entomologist on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

A NEW GENUS OF TROPIDUCHIDAE (HEMIPTERA: FULGOROIDEA) FROM CHINA AND VIETNAM, WITH DESCRIPTION OF EGGS

AI-PING LIANG
Department of Entomology, Institute of Zoology, Chinese Academy of Sciences
19 Zhongguancun Road, Beijing 100080, P.R. China

ABSTRACT

Paricanoides Liang gen. nov. (Hemiptera: Fulgoroidea: Tropiduchidae) is described to include two new species, *Paricanoides orientalis* Liang sp. nov. (type species, south China: Hainan Island and north Vietnam: Tonkin, Blao) and *Paricanoides dalatensis* Liang sp. nov. (Vietnam: Dalat). Male genitalia of the new species are illustrated and a dorsal habitus is provided for the male of *P. orientalis*. The eggs of *P. dalatensis* are described and illustrated with scanning electron micrographs. The new genus *Paricanoides* is distinguished by its forewing venation and is tentatively placed in the tribe Paricanini Melichar.

Key Words: *Paricanoides*, new species, SEM

RESUMEN

Paricanoides Liang gen. nov. (Hemiptera: Fulgoroidea: Tropiduchidae) esta descrita para incluir dos nuevas especies, *Paricanoides orientalis* Liang sp. nov. (la especie tipo, del sur de China: Isla de Hainan y de Vietnam del Norte: Tonkin, Blao) y *Paricanoides dalatensis* Liang sp. nov. (Vietnam: Dalat). Se ilustra los genitales de los machos de las nuevas especies y el dorso del macho de *P. orientalis*. Se describe e ilustra los huevos de *P. dalatensis* con micrográficos del microscopio electrónico (SEM). Se distingue el nuevo género *Paricanoides* por las venas del ala anterior y esta puesta tentativamente en el tribu Paricanini Melichar.

The Tropiduchidae is one of the smaller families of the planthopper superfamily Fulgoroidea, currently containing about 380 described species in over 110 genera (Metcalf 1954; Fletcher & Carver 1991; Yang et al. 1989). Members of the family can be separated from other planthoppers by the presence of a groove or a fine line separating the apex of the mesonotum from the rest of the mesonotal disc (O'Brien & Wilson 1985).

Species of Tropiduchidae are found in all warm temperate and tropical regions of the world associated with herbaceous and woody dicotyledons, palms, grasses, rushes and ferns, and have adapted themselves to habitats ranging from rain-forest to macchia and semi-desert (Fennah 1982). Both nymphs and adults feed above ground on their hosts, in most cases woody dicotyledons, and monocotyledons (primarily Poaceae and Arecaceae) (Wilson et al. 1999). Sixteen tropiduchid species were recorded as pests of 10 plants (Wilson & O'Brien 1985). *Numicia viridis* Muir is an important pest of sugarcane in southern Africa (Fennah 1969; Carnegie 1980). *Ommatissus lybicus* Bergevin, the 'Dubas bug', is a serious pest of date palm (*Phoenix dactylifera*) in the Middle East and North Africa (Hussain 1963; Asche & Wilson 1989).

The tropiduchid faunas of China, Indochina and southeast Asia remain inadequately studied and there is still much basic taxonomic work to be done on the group in these regions. While sorting and identifying Oriental Tropiduchidae from material in the Insect Collection of the Institute of Zoology, Chinese Academy of Sciences, Beijing, China and elsewhere, I found two undescribed species with very distinct forewing venation which could not be placed in any known genus. Specimens of the two species were collected from south China (Hainan Island) and Vietnam (Tonkin, Blao, Dalat). In addition, an unidentified female specimen, collected at Kalabakan, Borneo, was found in the Bernice P. Bishop Museum, Honolulu, Hawaii, USA. In the present paper, I describe and illustrate the new genus *Paricanoides* Liang gen. nov. and its two included new species *Paricanoides orientalis* Liang sp. nov. (type species) from south China (Hainan Island) and north Vietnam (Tonkin) and *Paricanoides dalatensis* Liang sp. nov. from Vietnam (Dalat). The new genus is tentatively placed in the tribe Paricanini Melichar. I also present a brief description of the eggs of *Paricanoides dalatensis* plus scanning electron micrographs, as ontogenetic stages in tropiduchids and other fulgoromorphans are largely unresearched.

MATERIALS AND METHODS

The specimens studied in the course of this work were from the Bernice P. Bishop Museum, Honolulu, Hawaii, USA (BPBM); the Insect Collection of the Institute of Zoology, Chinese Academy of Sciences, Beijing, China (IZCAS) and the

Downloaded From: https://bioone.org/journals/Florida-Entomologist on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

Department of Biology Insect Collection, Nankai University, Tianjin, China (NU).

Eggs were obtained for scanning electron microscopy (SEM) by dissecting the dry, pinned museum specimens. They and the female genitalia were mounted on aluminum stubs with double-sided sticky tape and coated with gold-palladium using a sputter coater. Observations were made with a JEOL JSM-6301F (Japanese Electronic and Optical Ltd., Tokyo, Japan) scanning electron microscope, operated at accelerating voltages of 15 kV.

Morphological terminology follows that of Kramer (1950) and Fennah (1982).

Descriptive Taxonomy

Paricanoides Liang gen. nov.

Type species: *Paricanoides orientalis* Liang sp. nov.

Description. Medium sized, somewhat stout tropiduchids (Figs. 1-4), length (from apex of vertex to tip of forewings) 12.8-14.0 mm. General color pale green, frons usually with an inverse U-shaped, reddish stripe (Figs. 16, 27); anterior, posterior and lateral margins of vertex and carinae on pronotum and mesonotum, usually reddish; forewings transparent, veins brown, apex usually suffused with brown (Figs. 1-4, 17).

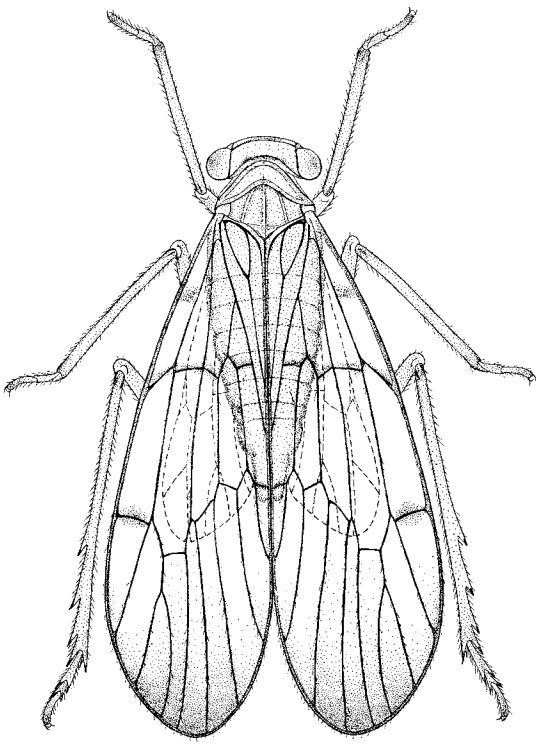
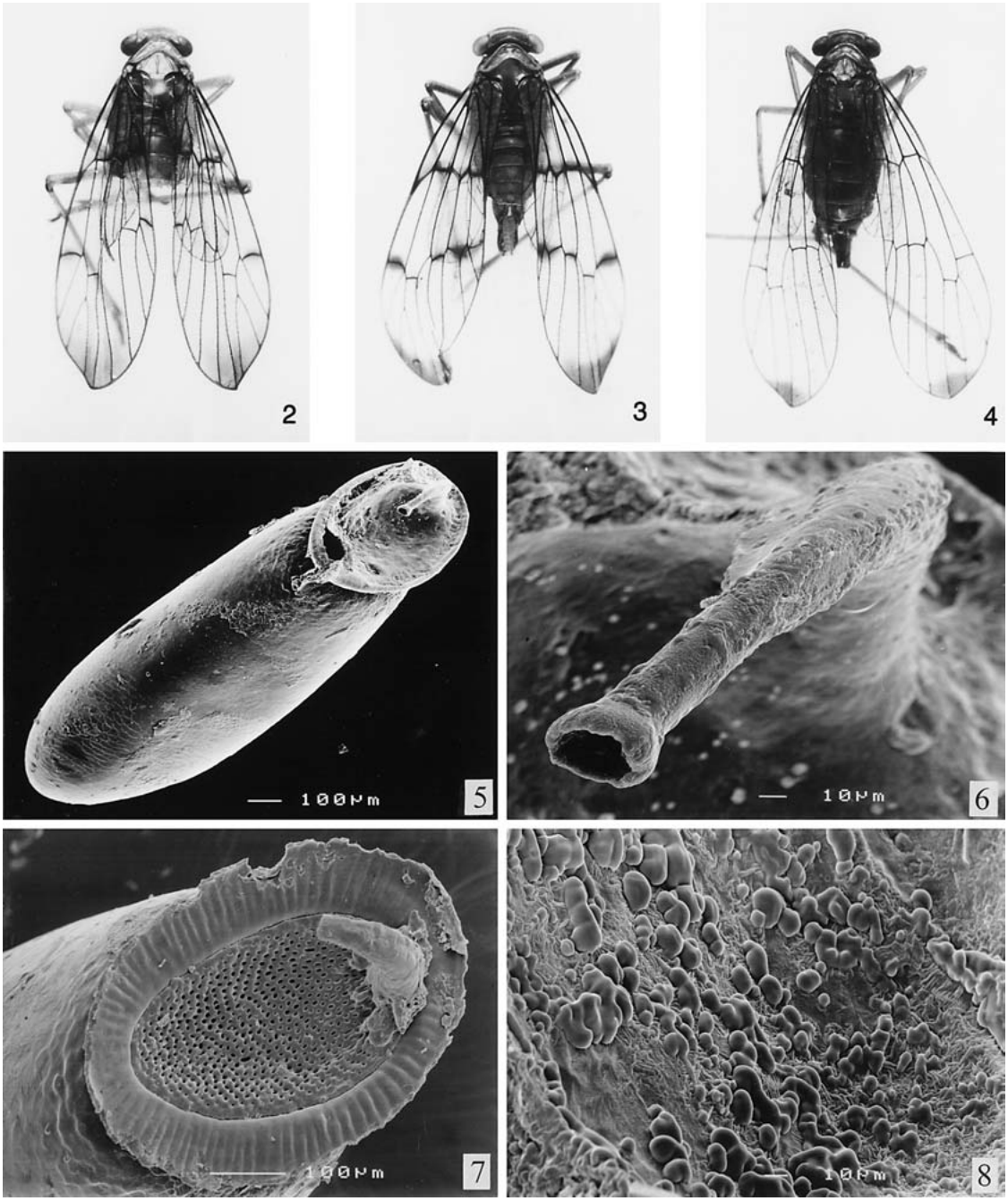


Fig. 1. *Paricanoides orientalis* Liang sp. nov. (China: Hainan Island, IZCAS): male paratype, dorsal habitus.

Head (Figs. 1-4, 15, 26) short and broad in dorsal view, distinctly broader than anterior part of pronotum; vertex shorter than pronotum in middle line, without median longitudinal carina (very fine carina present in *Paricanoides dalatensis* Liang sp. nov.), anterior margin not carinate, broadly arched or nearly straight, posterior margin finely carinate and arched anteriorly, lateral margins slightly carinate and converging anteriorly. Frons (Figs. 16, 27) broad and elongate, somewhat subquadrate, slightly longer than wide, basal part slightly wider than distal part in ventral view, surface smooth, without median carina (thickened median carina present in the unidentified female specimen collected from Borneo at BPBM), lateral margins not carinate. Postclypeus shorter than frons, relatively broad, smooth, without median carina, lateral margins not carinate. Anteclypeus narrow, without median and lateral carinae. Eyes oval. Ocelli two, small. Antennae with scape very short and small, ring-like; pedicel subglobose, short and small, covered with long setulae and about 15-20 disc-like sensory plaque organs, both setulae and sensory plaque organs extending to base of pedicel. Rostrum short, extending between trochanters of fore legs, apical segment short, longer than wide, slightly longer than 1/2 length of subapical segment. Pronotum (Figs. 15, 26) shorter than mesonotum in middle line, narrow anteriorly and broad posteriorly, disc relatively broad, strongly arched anteriorly, lateral marginal areas strongly curved down and nearly vertical, sublateral carinae broad, without median carina (very faint carina present in *Paricanoides dalatensis*), posterior margin angulately excavate with posterior marginal area broadly elevated and anteriorly sloping. Mesonotum (Figs. 15, 26) tricarinate on disc. Forewings (Figs. 1-4, 17) coriaceous, transparent, base relatively narrow, broad subapically; corium smooth, without granulation, costal marginal area without transverse veinlets; veins prominent and thickly covered with short setae dorsally and ventrally (veins in basal corial area not covered with setae dorsally); venation as in Figure 17, R branched apically, P and Cu forked much basally with cell PCu very short and small, Cu1 branched much basally; with 2 rows of transverse veinlets, one at basal 1/3 and the other at apical 1/3, enclosing 5 elongate cells in middle and 7-9 cells apically (11 apical cells in the unidentified female specimen collected from Borneo at BPBM), with 4 basal cells in corium before the first transverse veinlets. Hindwings (Figs. 1, 2) much smaller and shorter than forewings, about 0.4-0.6 times length of forewings, not extending beyond apex of ovipositor in females, veins prominent, thickly covered with short setae dorsally and ventrally, venation as in Figure 18. Legs elongate, hind tibiae with 3 lateral spines beyond middle and 6 apical black-tipped spines, metatar-

Downloaded From: https://bioone.org/journals/Florida-Entomologist on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

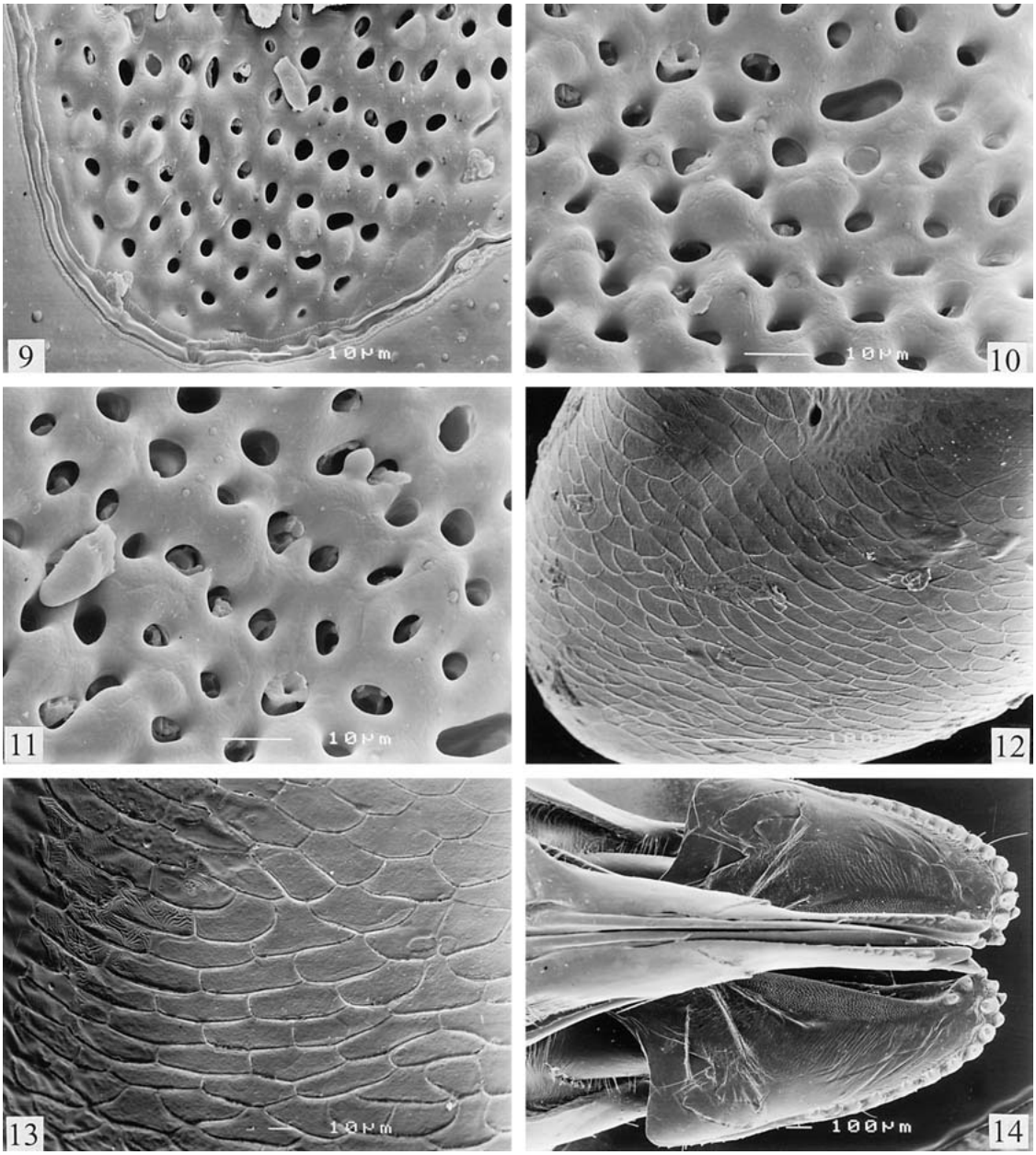


Figs. 2-8. *Paricanoides* species. 2-4. Dorsal habitus of *P. orientalis* Liang sp. nov. 2. male holotype (China: Hainan Island, IZCAS); 3. male paratype (Vietnam: Tonkin, IZCAS); 4. a female of non-type series (Vietnam: Blao (Balao)); 5-18. Scanning electron micrographs of eggs of *P. dalatensis* Liang sp. nov. 5. whole egg, dorsolateral view; 6. micropylar horn, dorsal view; 7. operculum, dorsal view; 8. waxy secretion on operculum.

sal segments I and II with 6-8 and 2 black-tipped spines apically, respectively.

Male genitalia (Figs. 19-25, 28-33) with pygofer narrow and high in lateral view, dorsal posterior margin angulately produced posteriorly, dorsal margin strongly excavated to accommodate anal tube, ventral margin strongly excavated anteriorly to accommodate parameres in ventral view. Anal tube very elongate and slender, anal style relatively short and small. Parameres

Downloaded From: https://bioone.org/journals/Florida-Entomologist on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use



Figs. 9-14. *Paricanoides* species. 9-11. respiratory pores on operculum; 12, 13. chorion surface; 14. female genitalia, ventral view, showing teeth of third valvula of ovipositor.

relatively large and broad, with apex somewhat roundly produced posteriorly in lateral view, upper margin with apex angulate or acute, with a lateroventrally directed process beyond the angulate or acute apex and a small dorsally directed process near middle. Aedeagus robust, asymmetrical; periandrium well developed, asymmetrical, surrounding penis at base, distally attached to penis ventrally, with an anterodorsally or posterodorsally directed process in middle at left side, apex with two dorsally directed processes or truncate at left side and having an apical, anterodorsally directed process at right side; penis with one apical, dorsally or anterodorsally directed process at left side and a subapical, branched process at right side.

Female genitalia with third valvula having 15-17 visible, short, stout teeth apically (18 teeth in

Downloaded From: https://bioone.org/journals/Florida-Entomologist on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

the unidentified female specimen collected from Borneo at BPBM), and 1 outer tooth apically (Fig. 14).

Etymology. Named for its similarity of appearance to *Paricana* Walker 1857. Gender: feminine.

Included species and distribution. Two new species and one unidentified species currently known only from one female specimen which was collected at Kalabakan, Borneo and is deposited in BPBM; south China (Hainan Island), Vietnam (Tonkin; Dalat), and Borneo.

Remarks. The new genus can be easily distinguished from other known Oriental tropiduchid genera by the combination of the following characters: head short and broad, vertex with anterior, posterior and lateral margins not distinctly carinate, without median carina; frons broad and smooth, usually with an inverse U-shaped reddish stripe, lateral margins not carinate, without median carina (thickened median carina present in one unidentified female specimen collected from Borneo at BPBM); forewings with P and Cu forked extremely basally and cell PCu very small, with two rows of cross-veins at basal 1/3 and apical 1/3, respectively, enclosing 5 elongate cells in middle and 7-11 apical cells (Figs. 1-4, 17); hind tibiae with 3 lateral spines beyond middle; and the male genitalic structure (Figs. 19-25, 28-33). The forewing venation of the new genus appears very unusual and distinct within Tropiduchidae (Figs. 1-4, 17; see also Fennah 1982: Figs. 1-26, 35, 36).

Fennah (1982) revised the higher classification of the Tropiduchidae and recognized 15 tribes in the family: Alcestini, Catulliini, Cixiopsini, Cyphoceratopini, Eporini, Eutropistini, Isporisini, Neommatissini, Paricanini, Remosini, Tambiniini, Tangiini, Tropiduchini, Trypetimorphini and Turneriolini. More recently, Szwedo (2000) established the sixteenth tribe, Jantaritambiini, based on a fossil species *Jantaritambia serafini* Szwedo, described from Eocene Baltic amber. The tribal system of Fennah (1982) is considered purely phenetic rather than phylogenetic since it was primarily based on diagnostic characters without any discussion of homology and evolutionary trends (Asche & Wilson 1989). Monophylies of these tribes and their included genera and the relationships among the genera and tribes have yet to be tested cladistically (Asche & Wilson 1989; Szwedo 2000; Liang & Jiang 2003).

I tentatively place *Paricanoides* in the tribe Paricanini Melichar, mainly based on the forewing venation, the shape of head and antennae and the number of the lateral spines on hind tibiae. Paricanini, as defined by Fennah (1982), includes only 3 genera, *Paricana* Walker 1857 (Borneo, Sumatra, Malay Peninsula, Japan: Bonin Island), *Leusaba* Walker 1857 (Borneo, Philippines, Sri Lanka) and *Stacota* Stål 1859 (Philippines, Sri Lanka), all from the Oriental region. *Paricanoides* can be distinguished from *Paricana* by the forewings with few apical and subapical cells, P and Cu forked more basally and cell PCu much shorter and smaller, two rows of cross-veins located at basal 1/3 and apical 1/3, respectively; and hind tibiae with 3 lateral spines beyond middle (see Walker 1857). It can be distinguished from *Leusaba* by the frons and postclypeus without median carina, forewings with few apical and subapical cells, and hindwings with few apical cells (see Walker 1857; Distant 1906). It can be separated from *Stacota* by the very short head, distinctly shorter than broad; frons broad, subquadrate; vertex and frons not carinate laterally and without median carina; and forewings without transverse veinlets on costal cell (see Stål 1859; Distant 1906).

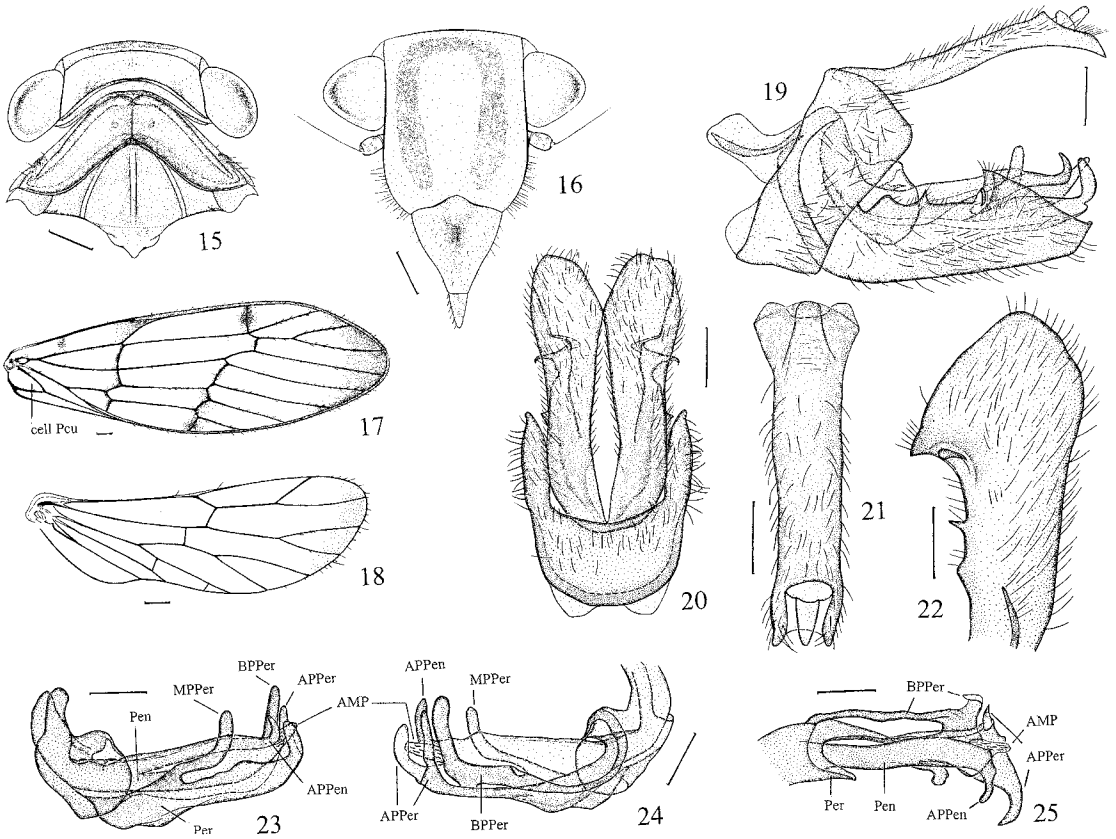
Based on the shape of antennae and the number of lateral spines on hind tibiae, *Paricanoides* is similar to members of the Isporisini (Oriental) but its head morphology and forewing venation indicate that it belongs in the Paricanini. *Paricanoides* differs from members of the Isporisini in the head distinctly short and broad, frons with lateral margins not elevated and lacking median carina, and the forewings with the cell PCu very short and small. *Paricanoides* is also similar to *Pseudoparicana* Melichar 1914 (Tropiduchini) from New Guinea in forewing venation but differs from the latter in the vertex not carinate medially, hind tibiae with 3 lateral spines, and the forewing with the first transverse veinlets much more basal.

Paricanoides orientalis Liang sp. nov.
(Figs. 1-4, 15-25)

Description. Length (from apex of vertex to tip of forewings): ♂ 12.8-13.8 mm; ♀ 13.8 mm. Body length (from apex of vertex to tip of anal tube): ♀ 9.3 mm. Forewing length: ♂ 11.0-12.0 mm; ♀ 12.0 mm.

General color pale greenish or greenish stramineous, probably green in life; frons greenish, with an inverse U-shaped, reddish stripe (Fig. 16); antennal pedicel and ocelli pale reddish; vertex with hind carinate margin with two brown suffusion areas laterally; pronotum with broadly elevated anterior and posterior margins and carinae on mesonotum pale reddish or reddish ochraceous; a transverse band on lateral, ventrally curved area of pronotum blackish fuscous; rostrum with apical segment fuscous; forewings (Figs. 1-4, 17) opaque, veins brown, a short costal band near base brown (the band sometimes missing), apex and areas surrounding the cross veins at basal 1/3 and apical 1/3 suffused with brown or fuscous, setae on veins brown; hindwings (Fig. 18) hyaline, veins and setae on veins brown; abdomen with lateral margins and lateral sides of hind margins of tergites and lateral margins of sternites blackish fuscous, tergites somewhat brownish; pygofer with dorsal, hind and ventral margins blackish fuscous, male parameres with

Downloaded From: https://bioone.org/journals/Florida-Entomologist on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use



Figs. 15-25. *Paricanoides orientalis* Liang sp. nov. 15. head, pronotum and mesonotum, dorsal view; 16. head, ventral view; 17. right forewing; 18. right hindwing; 19-25. male genitalia. 19. pygofer, lateral view; 20. pygofer, ventral view; 21. anal tube, dorsal view; 22. left paramere, lateral view; 23. aedeagal shaft, left lateral view; 24. aedeagal shaft, right lateral view; 25. aedeagal shaft, dorsal view. Abbreviations: AMP = apical membranous process of penis; APPen = apical process of penis; APPer = apical process of periandrium; BPPer = branched process of periandrium; MPPer = middle process of periandrium; Pen = penis; Per = periandrium. Scale bars = 0.5 mm.

apical 1/4 blackish fuscous; apices and bases of fore and middle tibiae fuscous, spines on hind legs black-tipped, claws black.

External characters as in generic description above. Metatarsal segment II with 6 spines apically. There are some variations in the number of the apical cells in forewings. In one male paratype specimen collected from Tonkin, Vietnam, the right forewing has 9 apical cells but the left forewing has 10 (resulting from M1 also branched). In one female specimen (Fig. 4) taken at Blao, Vietnam, both the left and right forewings have the R unbranched apically and have only 8 apical cells.

Male genitalia with pygofer narrow and high, wider dorsally than ventrally, with dorsal posterior margin angularly produced posteriorly in lateral view; dorsal margin deeply excavated to accommodate anal tube in dorsal view (Fig. 19); ventral margin strongly excavated anteriorly to accommodate parameres in ventral view (Fig. 20). Anal tube elongate, narrow and slender in dorsal view, apex somewhat claw-like in dorsolateral view (Figs. 19, 21); anal style relatively short and small, not reaching beyond the apical ventral margin of anal tube. Parameres (Figs. 19, 20, 22) symmetrical, relatively large, short and broad, apex expanded and relatively broad, somewhat angulately produced caudad in lateral view, with a stout, inward directed process on upper margin at apex, beyond this stout process with a small, lateroventrally directed, spinous process; upper margin with a very small nodal process near base and an acute, dorsally directed process at middle in lateral view. Aedeagus (Figs. 19, 23-25) somewhat elongate, robust and mostly sclerotized, asymmetrical, periandrium surrounding penis at base, distally attached to penis ventrally, with two dorsally directed processes at apex and one posterodorsally directed process near middle at left side; penis with one membranous process and one dorsally directed process at apex (Figs. 23-25) and a branched process at right side at apex: one branch relatively short, directed dorsally, the other branch very elongate, tapered from base to

Downloaded From: https://bioone.org/journals/Florida-Entomologist on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

apex, strongly directed anteriorly, with apical part curved posterodorsally (Fig. 24).

Female genitalia with anal tube narrow and short, shorter than third valvulae; anal style very short and small, not extending beyond apical ventral margin of anal tube; third valvulae each having 15 visible, short teeth apically and one small outer tooth apically.

Etymology. This new species is named for its distribution in the Oriental region.

Distribution. South China (Hainan Island) and Vietnam (Tonkin, Blao).

Specimens examined. Holotype ♂, CHINA: Hainan Island, Jianfengling (18°7'N, 108°8'E), Tianchi, 750 m, 24.iii.1980 (S. Y. Wang) (IZCAS). Paratypes. CHINA: Hainan Island, 1♀, same data as holotype except 900 m, 11.iv.1980 (IZCAS); 1♂, Jianfengling, 12.iv.1980 (S. Z. Ren) (NU). [VIETNAM]: 2♂♂, Tonkin, Mont Bavi, 900-1000 m, viii.1940 (P. A. de Cooman) (IZCAS).

Other specimen examined. VIETNAM: 1♀, Blao (Balao), 500 m, 14-21.x.1960 (C. M. Yoshimoto) (BPBM). This female specimen is externally very similar to the above type specimens. But both the left and right forewings of this female specimen have vein R unbranched apically and have only 8 apical cells (Fig. 4). In addition, the metatarsal segment II is somewhat covered ventrally with tomenta and has 8 black-tipped spines apically.

Remarks. This species can be distinguished from other known tropiduchids from China and adjacent regions by its short and broad vertex (Figs. 1-4, 15), vertex and frons without median carina (Figs. 15, 16), frons with an inverse U-shaped, reddish stripe (Fig. 16), distinct forewing venation (Figs. 1-4, 17) and the shape of the male genitalia (Figs. 19-25). It can be separated from the other species in the genus, *P. dalatensis* from Vietnam (Dalat) (see below) by the vertex relatively broader and shorter (Fig. 15); metatarsal segment II with 6 apical spines; and the shape of the male genitalia, especially anal tube relatively shorter and narrower in dorsal view (Fig. 21), parameres with upper margin with a stout, inward directed process at apex (Figs. 19, 22), and different processes on aedeagus as noted above (Figs. 19, 23-25).

Paricanoides dalatensis Liang sp. nov.
(Figs. 5-14, 26-33)

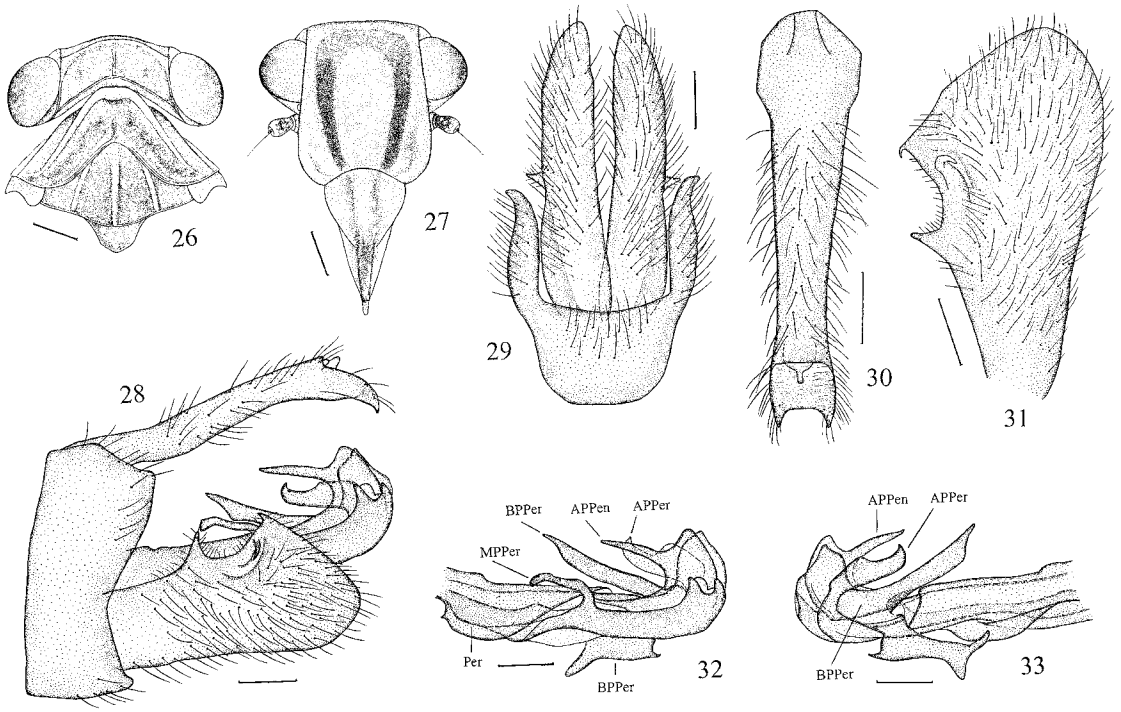
Description. Length (from apex of vertex to tip of forewings): ♂ 13.50 mm, ♀ 14.00 mm. General color and external appearance similar to the above new species, with vertex having very fine median carina, pronotum with very faint median carina, apex of frons and carinae on pronotum and mesonotum distinctly reddish, inverse U-shaped stripe on frons with lateral branches dark brown or fuscous; forewings without basal brown band at basal costal area; tarsal segments of fore and middle legs dark brown; vertex relatively narrow; metatarsal segment II with 7 black-tipped spines apically.

Male genitalia with pygofer (Fig. 28) in lateral view narrow and high, wider dorsally than ventrally, with dorsal posterior margin angularly produced posteriorly, dorsal margin deeply excavated anteriorly to accommodate anal tube in dorsal view, ventral margin very strongly excavated anteriorly to accommodate parameres in ventral view (Fig. 29). Anal tube (Figs. 28, 30) elongate, with base relatively broad, gradually narrowing toward apex with apex slightly expanded, apex nearly claw-like in dorsolateral view; anal style (Figs. 28, 30) very small and short, not reaching beyond apical ventral margin of anal tube. Parameres (Figs. 28, 29, 31) relatively short and broad (Figs. 28, 31), apex very broadly produced posteriorly, upper margin with a very small, anterodorsally directed, acute process at apex, beyond this acute process with a small, lateroventrally directed, spinous process, with a posterodorsally directed, triangular process on upper margin near middle in lateral view (Fig. 28); ventral margin relatively straight in lateral view. Aedeagus (Figs. 28, 32, 33) asymmetrical, periandrium enclosing penis at basal 1/2 and surrounding penis ventrally at apical 1/2, apex excavated medially at left side (Figs. 28, 32), with one anterodorsally directed process near middle at left side (Figs. 28, 32) and one apical, anterodorsally directed process at right side (Fig. 33); penis with one apical, anterodorsally directed process with very broad laminate base at left side (Figs. 28, 32) and one subapical branched process at right side: one process relatively elongate and anterodorsally directed, the other process directed anteroventrally with somewhat forked apex (Fig. 33).

Female genitalia (Fig. 14) with third valvulae each having 16-17 short stout teeth apically and one small outer tooth apically.

Eggs. Overall appearance elongate-oval (Fig. 5), length 1.32-1.45 mm; width near bottom 0.48-0.65 mm. The egg surface has two main regions: a specialized area and an unspecialized egg capsule (Figs. 5, 7). The specialized area is characterized by a large respiratory plate containing the operculum and a micropylar horn in apical portion (Figs. 5-7). The operculum (Figs. 5, 7) is ellipsoidal in shape, about 0.48-0.56 mm wide (including the marginal collar). The operculum has a clear marginal collar with the marginal length of the collar being about 88-100 µ (Figs. 5, 7) but has a clear boundary separating the operculum from the surrounding egg surface and facilitating larval eclosion (Fig. 9). The surface of the operculum is covered with many respiratory pores (Figs. 7, 9-11). They are mostly oval or rounded with a few being ellipsoidal. The opening of the rounded or oval pores measures about 2.2-5.6 µ wide and the opening of the elongate pores measures about 6.0-

Downloaded From: https://bioone.org/journals/Florida-Entomologist on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use



Figs. 26-33. *Paricanoides dalatensis* Liang sp. nov. 26. head, pronotum and mesonotum, dorsal view; 27. head, ventral view; 28. pygofer, lateral view; 29. pygofer, ventral view; 30. anal tube, dorsal view; 31. left paramere, lateral view; 32. aedeagal shaft, left lateral view; 33. aedeagal shaft, right lateral view. Abbreviations: APPen = apical process of penis; APPer = apical process of periandrium; BPPer = branched process of periandrium; MPPer = middle process of periandrium; Per = periandrium. Scale bars = 0.5 mm.

12.8 µ long. The apical micropylar horn (Figs. 5, 6) is relatively long (about 0.28-0.36 mm in length) and narrows gradually towards its apex with the extreme apex distinctly expanded and hollow internally. The opening of the apical micropylar horn is about 27.0-28.8 µ. The chorion surface is covered with a reticulate, polygonal pattern (Figs. 12, 13).

Information on the eggs of Tropiduchidae is very limited. The egg of *Paricanoides dalatensis* is generally similar to that of *Ommatissus binotatus* Fieber (Guglielmino et al. 1997) and *Tambinia rubrolineata* Liang (Liang & Jiang 2003) but differs in the operculum having a distinct collar and different shapes of the openings of the respiratory pores on the operculum and the respiratory horn being very long (Figs. 5-7, 9-13).

Etymology. This new species is named for its occurrence in Dalat, Vietnam.

Distribution. Vietnam (Dalat).

Specimens examined. Holotype ♂, VIETNAM: Dalat, 6 km S., 1400-1500 m, 9.vi-7.vii.1961 (N. R. Spencer) (BPBM). Paratype. VIETNAM: 1♀, same data as holotype (BPBM).

Remarks. This species can be distinguished from the above new species by the vertex relatively narrower and longer (Fig. 26); metatarsal segment II with 8 apical spines; and the shape of the male genitalia, especially the anal tube relatively longer and broader in dorsal view (Fig. 30), parameres with an acute process on upper margin at apex (Fig. 31) and the distinct processes on aedeagus as noted above (Figs. 28-33).

Acknowledgments

I am grateful to Mr. David J. Preston and Dr. Scott E. Miller (BPBM) and Prof. Le-Yi Zheng (NU) for loans of specimens or access to the collections in their charge. I thank Ms. Shu-Ming Ma and Guo-Mei Jiang (IZCAS) for preparing the illustrations and Mr. L.-F. Fu (Electron Microscope Unit, Advanced Materials Laboratory, Ministry of Education of China, Beijing) for providing technical assistance with the scanning electron microscopy. I wish also to thank Dr. R. M. Baranowski (University of Florida, TREC, Homestead, FL, USA) and Dr. Gary Steck (Division of Plant Industry, Florida Department of Agriculture & Consumer Services, Gainesville, FL, USA) for giving much welcome support and comments on the manuscript. This work was supported by the National Natural Science Foundation of China (grant number 39925006), the CAS Innovation Program (KSCX3-IOZ-01) and a Presidential Research Fellowship (A2902170) from the Chinese Academy of Sciences.

Downloaded From: https://bioone.org/journals/Florida-Entomologist on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use

Literature Cited

Asche, M., and M. R. Wilson. 1989. The plant-feeding planthopper genus *Ommatissus* (Homoptera: Fulgoroidea: Tropiduchidae). Syst. Entomol. 14: 127-147.

Carnegie, A. J. M. 1980. Egg mortality of *Numicia viridis* Muir (Homoptera: Tropiduchidae) in sugarcane and in indigenous hosts. J. Entomol. Soc. South Africa 43: 215-222.

Distant, W. L. 1906. The fauna of British India, including Ceylon and Burma. Rhynchota 3 (Heteroptera-Homoptera). Taylor & Francis, London. xiv + 503 pp.

Fennah, R. G. 1969. Damage to sugar cane by Fulgoroidea and related insects in relation to the metabolic state of the host plant, pp. 386-389. *In* J. R. Williams, J. R. Metcalfe, R. W. Mongomery, and R. Mathes (eds.), Pests of Sugar Cane. Elsevier Publishing Company, Amsterdam, London & New York.

Fennah, R. G. 1982. A tribal classification of the Tropiduchidae (Homoptera: Fulgoroidea), with the description of a new species on tea in Malaysia. Bull. Entomol. Res. 72: 631-643.

Fletcher, M. J., and M. Carver. 1991. Superfamily Fulgoroidea, pp. 474-479. *In* CSIRO (ed.), The Insects of Australia. A Textbook for Students and Research Workers. Vol. 1. Melbourne University Press: Carlton.

Guglielmino, A., A. R. Taddei, and M. Carcupino. 1997. Fine structure of the eggshell of *Ommatissus binotatus* Fieber (Homoptera, Auchenorrhyncha, Tropiduchidae). Int. J. Insect Morphol. & Embryol. 26(2): 85-89.

Hussain, A. A. 1963. Biology and control of the dubas bug, *Ommatissus binotatus lybicus* De Berg. (Homoptera, Tropiduchidae), infesting date palms in Iraq. Bull. Entomol. Res. 53: 737-745, pl. 18.

Kramer, S. 1950. The morphology and phylogeny of auchenorrhynchous Homoptera (Insecta). Illinois Biol. Monogr. 20: 1-109, pls. 1-15.

Liang, A.-P., and G.-M. Jiang. 2003. Two new species of *Tambinia* Stål (Hemiptera: Tropiduchidae) from China, Laos and Vietnam, with description of eggs. J. Kansas Entomol. Soc.76: 509-517.

Melichar, L. 1914. Monographie der Tropiduchinen (Homoptera). Verh. Naturf. Ver. Brünn 53: 1-145.

Metcalf, Z. P. 1954. General Catalogue of the Homoptera. Fasc. IV. Fulgoroidea. Part 11. Tropiduchidae. North Carolina State College, Raleigh, NC. 167 pp.

O'Brien, L. B., and S. W. Wilson. 1985. Planthopper systematics and external morphology, pp. 61-102. *In* L. R. Nault and J. G. Rodrigues (eds.), The Leafhoppers and Planthoppers. New York: Wiley and Sons, Inc.

Stål, C. 1859. Novae quaedam Fulgorinorum formae speciesque insigniores. Berl. Entomol. Zeits. 3: 313-328.

Szwedo, J. 2000. First fossil Tropiduchidae with a description of a new tribe Jantaritambiini from Eocene Baltic amber (Hemiptera: Fulgoromorpha). Ann. Soc. Entomol. Fr. (N. S.) 36: 279-286.

Walker, F. 1857. Catalogue of the homopterous insects collected at Sarawak, Borneo, by Mr. A. R. Wallace, with descriptions of new species. J. Proc. Linn. Soc. 1: 141-175, pls. 7-8.

Wilson, S. W., C. Mitter, R. F. Denno, and M. R. Wilson. 1999. Evolutionary patterns of host plant use by delphacid planthoppers and their relatives, pp. 7-45. *In* R. F. Denno and T. J. Perfect (eds.), Planthoppers: their ecology and management. New York: Chapman Hall.

Yang, J. T., C. T. Yang, and M. R. Wilson. 1989. Tropiduchidae of Taiwan (Homoptera: Fulgoroidea). Collected Papers on Homoptera of Taiwan, Taiwan Mus. Spec. Publ., Ser. 8: 65-115 [Chinese abstract p. 66].

Downloaded From: https://bioone.org/journals/Florida-Entomologist on 28 Mar 2024
Terms of Use: https://bioone.org/terms-of-use