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# On the taxonomy of the tribe Pisachini (Hemiptera: Fulgoromorpha: Nogodinidae) with the description of new taxa from China and Vietnam

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## Abstract

*Goniopsarites* **gen. nov.** is described from China in the tribe Pisachini with *G. fronticonvexus* **sp. nov.** as the type species. The genus *Pisacha* is revised, four new species *P. yinggensis* **sp. nov.**, *P. baculiformis* **sp. nov.**, *P. falcata* **sp. nov.**, *P. balteiformis* **sp. nov.** are described, and *P. encaustica* (Jacobi, 1916) comb. nov. & stat. rev. is reestablished which has been treated as *P. naga* according to specimens from Taiwan. Identification keys to three genera of the tribe Pisachini and to all species of *Pisacha* are presented.

**Key words:** Fulgoroidea, new genus, new species, Nogodininae, taxonomy

## Introduction

The higher classification of the Nogodinidae was proposed by Fennah (1978, 1984, 1987). Recently, it was partly revised by Gnezdilov (2007a, 2008, 2009, 2012). Accoding to these works on Nogodinidae, 89 extant genera of Nogodinidae (Bourgoin, 2014) are included in three subfamilies: Nogodininae Melichar, 1898, Gastriniinae Fennah, 1987, Colpopterinae Gnezdilov, 2003 (Gnezdilov, 2012). The Nogodininae have eight tribes: Nogodinini Melichar, 1898, Epacriini Fennah, 1978, Bladinini Kirkaldy, 1907, Pisachini Fennah, 1978, Varciini Fennah, 1978, Mithymnini Fennah, 1967, Lipocalliini Fennah, 1984, Tongini Kirkaldy, 1907.

The tribe Pisachini was formerly erected by Fennah (1978), and can be characterized by "teeth on basal metatarsal segment arranged in a deep curve, partly enclosing a long setiferous eminence; third valvalae of ovipositor dilated and thickened in dorsal half, with posterior surface flattened and bearing a broad even tract of minute denticles". It was considered to comprise *Pisacha* Distant, 1906, *Soaemis* Jacobi, 1916 and *Goneopsara* Metcalf, 1952. The genus *Pisacha* Distant was erected for *Pisacha naga* Distant 1906 from India, later, the other species *P. kwangsiensis* Chou et Lu 1977 from China was reported. However, the genus *Soaemis* Jacobi was treated as a synonym of *Pisacha* Distant by Ishihara (1965). The genus *Goneopsara* Metcalf (new name for *Goniopsis* Melichar, 1899) has a single species *Goniopsara mystica* (Melichar, 1899) from Singapore. So far, two genera and three species are included in this tribe.

In the present paper, the genus *Goniopsarites* **gen. nov.** is described with only one species *G. fronticonvexus* **sp. nov.**, which is distributed in South China. In addition, three new species of genus *Pisacha* from South China and one new species from Vietnam are reported. Currently, All three included genera in tribe Pisachini are distributed in Oriental region.

## Material and methods

The external morphology was observed under a Leica MZ 125 microscope. All measurements are in millimeters (mm). The morphology terminology follows Chou *et al*. (1985), Bourgion *et al*. (2013) and Gnezdilov (2012) for

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the external morphology with the venation scheme, the male genitalia mainly follows Yang & Chang (2000), and the terms "capitulum of style" and "anal column" adopted after Gnezdilov (2002a). The description of the female genitalia mainly follows Bourgoin (1993) except the gonoplac adopted after Gnezdilov (2002b). The genital segments of the examined specimens were removed and macerated in 10% NaOH solution at approximately 90°C for about 15 minutes, and subsequently transferred into glycerin. Photographs (Figs 9–13, 15, 16) were made using a Nikon SMZ1500 stereomicroscope with a Q-image CCD camera. Images were produced using the software Automontage (Synoptics, U.K.). The rest of photographs of the specimens were made using a Leica M205A microscope with Leica DFC Camera. Final images were produced using the software version LAS (Leica Application Suite) V3.7. All the specimens of new species studied are deposited in the Entomological Museum of Northwest Agriculture and Forestry University (NWAFU), Yangling, China.

## Taxonomy

### Tribe Pisachini Fennah, 1978

### Type genus: *Pisacha* Distant, 1906

### Key to genera of Pisachini

1. Frons with lateral longitudinal keels from or nearly from upper margin, mesonotum with anterior margin convex medially obviously surpassing the lower edge of eyes . . . . . 2
-. Frons with lateral keels from middle part, mesonotum with anterior margin slightly arched, apical point in the same level of the lower edge of eyes . . . . . *Goniopsarites* **gen. nov.**
2. Frons with three longitudinal keels reaching frontoclypeal suture, lateral margins distinctly angulate below antennae (Figs 28–30) . . . . . *Goniopsara* Metcalf
-. Frons with three longitudinal keels not reaching frontoclypeal suture, lateral margins vertical and nearly parallel (Figs 31–34) . . . . . *Pisacha* Distant

### *Goniopsarites* gen. nov.

**Type species.** *Goniopsarites fronticonvexus* **sp. nov.**, here designated.

**Description.** Head with eyes slightly narrower than pronotum (Figs 1, 4). Vertex quite broad, 7.0 times wider than long in middle line, with disc depressed, lateral margins strongly keeled, anterior margin weakly concave and sinuate at middle, and posterior margin shallowly concave; median carina feeble, sublateral keels elevated (Figs 1, 4). Frons long, 1.7 times longer than wide in mid line, 1.5 times wider at widest upper margin than at base; upper margin deeply concave, lateral margin distinctly acutely elevated, slightly concave in middle; median carina distinct, disappeared near the lower third of frons, with Y-shaped keel and a pair of short keels at lower part; disc of frons depressed, abruptly forward protruding near frontoclypeal suture in lateral view (Figs 3, 5, 6). Clypeus narrow, triangular, with median carina, lateral margins extremely carinate, median area particularly convex in lateral view (Figs 3, 5, 6). Frontoclypeal suture acute (Fig. 3). Rostrum elongate surpassing post trochanters, apical segment short, subapical segment three times as long as apical segment (Fig. 3). Ocelli present. Eyes oval. Antennae with scape columned and short, pedicel subglobose. Pronotum about 3.0 times longer than vertex in middle line, with median carina (Fig. 4); anterior margin obtusely convex between eyes, posterior margin slightly concave, both distinctly carinate; lateral lobe distinctly broadened (Fig. 5). Mesonotum large, 2.5 times as long as vertex and pronotum in middle line, 1.5 times wider than long; disc slightly flat, with median carina and parallel lateral carinae, which are joined with arcuately transverse keel near anterior margin (Fig. 4).

Tegmina steeply tectiform (Fig. 2), much elongate and broad, costal margin strongly and convexly arched, but concave near apex, apical margin rounded obliquely, posterior margin straight, widest at basal half, distinctly narrow on apical third, about twice longer than wide at widest part; precostal area much narrower than costal cell (about 1:4) with no transverse veinlets. Sc+R and M veins emiting from the top of basal cell, Cu vein arising from lower part of basal cell, Sc+R forking very closed to basal cell, M forking slightly at one third from basal part, Cu forked a bit after middle of tegmen. Claval suture extraordinary distinct, clavus much elongated with apex reaching

apical margin of tegmen and terminating with a distinct spine, two claval veins (A1 and A2) united at middle from base of clavus, with sparse transverse veinlets. Both longitudinal veins and transverse veinlets markedly prominent, transverse veinlets obviously dense and reticulated at apical part (Fig. 7). Wings well-developed and distinctly divided into three areas: preanal area, vanal region and anal area by two weak incisions of apical margin; costal margin weakly concave with small coupling lobe (Fig. 8, indicated by arrow), apical margin with minute setae. The R vein bifurcated at one-quarter near apex; M vein basally fused with cubitus vein and simple; Cu vein tetrafurcate at middle. Both the CuA and Pcu postcubitus vein simple, almost closed to each other at apex, but not fused. First anal vein (A1) vein quadrifurcated, but second anal vein (A2) simple, fused with the fourth embranchment of A1 after basal part to terminal. The longitudinal vein R, M, and Cu separately branched apically. About 6–7 transverse veinlets on apical region. Veins as in fig. 8.

Fore femora and tibiae moderately broad, hind tibia widened at apical half and with two lateral spines (Fig. 10). Spinal formula of hind leg 12–11–2, indicating number of spines at apex of hind tibia and hind tarsomeres I and II (Fig. 9).

*Male terminalia*. Anal tube in lateral view large and long, widest subapically, bent down at midlength. Anal column short, located at middle (Figs 12, 14, 18). Genital styles expanding distally, subtriangular in lateral view. Capitulum short, without teeth. Aedeagus moderately dumpy, apical portion curved cephalad in lateral view.

*Female terminalia*. Anal tube relatively large and broad, widest medially, bent down at midlength in lateral view. Anal column very short, situated at point of flexure (Fig. 17). Gonoplac minutely denticulate in posterior view, basal part bearing a black sclerous clavate structure close to base of gonapophyses IX (Figs 13, 21). Gonapophyses IX elongated, triangular-shaped (Fig. 24). Gonapophyses VIII narrow and long, tapering distally, with teeth along dorsal margin (Fig. 23).

**Diagnosis**. The new genus resembles *Goniopsara* Metcalf (Melichar, 1899), but can be distinguished from the latter by: 1) frons with upper margin deeply concave, lateral keels from lateral margin, disc forward protruding at lower part (in *Goniopsara*, frons with upper margin almost straight, lateral keels from upper margin, disc flat); 2) mesonotum with anterior margin slightly arced, apical point in the same level of the lower edge of eyes (in *Goniopsara*, mesonotum with anterior margin acutely convex medially surpassing the lower edge of eyes obviously); 3) tegmen with costal margin strongly convex near basal one third, clavus nearly reaching apical margin, with apex terminating in a distinct spine (in *Goniopsara*, costal margin slightly convex, clavus with apex about one forth from apical margin, and not terminating in a spine).

**Etymology**. *Goniopsarites* refers to the resemblance of this genus to *Goniopsara* Metcalf. The gender is masculine.

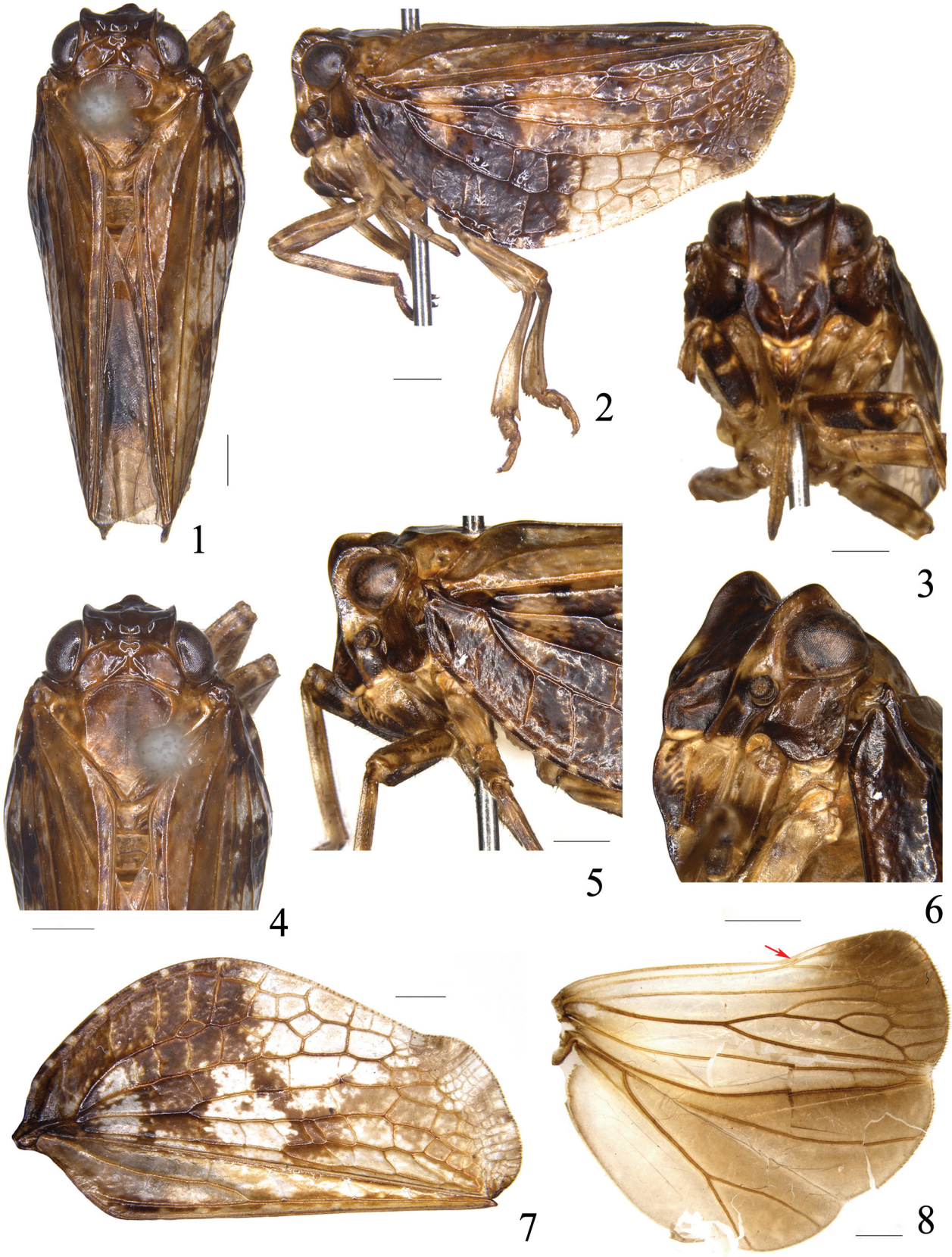
### *Goniopsarites fronticonvexus* sp. nov.

(Figs 1–27)

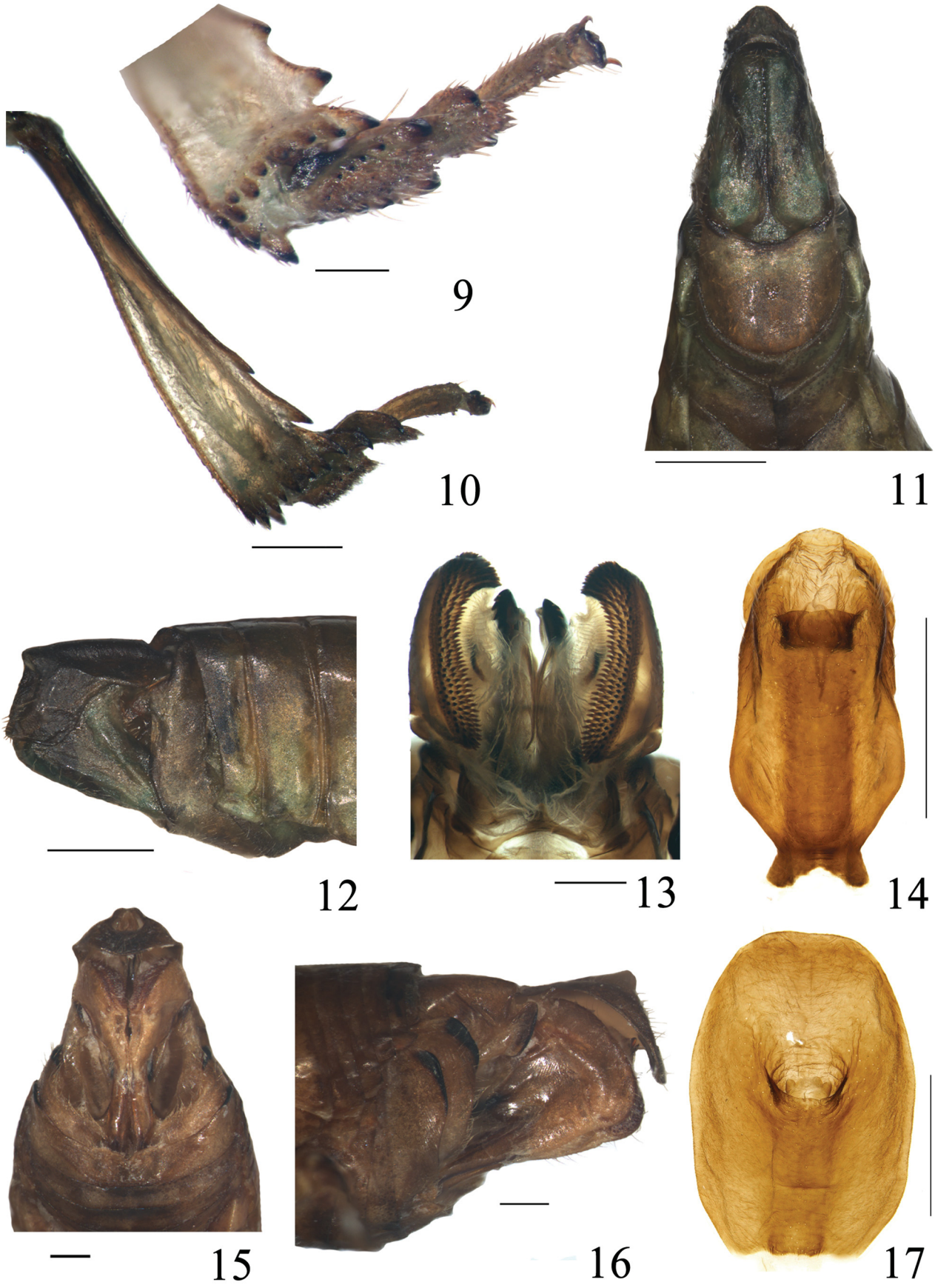
**Description.** Length, male (N=2) (including tegmen): 11.0–11.5 mm, length of tegmen: 9.6–10.0 mm; female (N=1) (including tegmen):13.2 mm, length of tegmen: 12.0 mm.

General color infuscate. Vertex fuscous. Frons pitchy, with a pallide-flavens transverse bar near upper margin, transverse stramineous fascia near frontoclypeal suture, and two yellow blotches near lateral margins above antennae; Y-shaped sublateral keel partly yellow. Clypeus pale cinereous with three yellow speckles at base, median carina fusco-rufous, median portion with parallel oblique pale yellow striae. Ocelli yellow. Eyes pitchy. Antenna fusco-piceous. Gena yellow with a large black speckle below antenna and a relatively small black spot in front of it. Pronotum fuscous, lateroventral pronotal lobes pitchy. Mesonotum fusco-piceous at disc, pale fulvous laterally. Tegmina translucent, tawny, with large irregularly fusco-piceous macula at basal half, and pale crineous triangular macula from apical angle to claval suture at distal half; precostal area with eight yellow spots; longitudinal veins reddish-brown or dark brown, transverse veinlets ochraceous. Wings caesious to pale fuscous, veins fuscescent. Legs testaceous with black fascia and annulus. Abdomen fusco-piceous on dorsum and ventrite, dark green laterally. Genital styles green-black. Male anal tube pitchy.

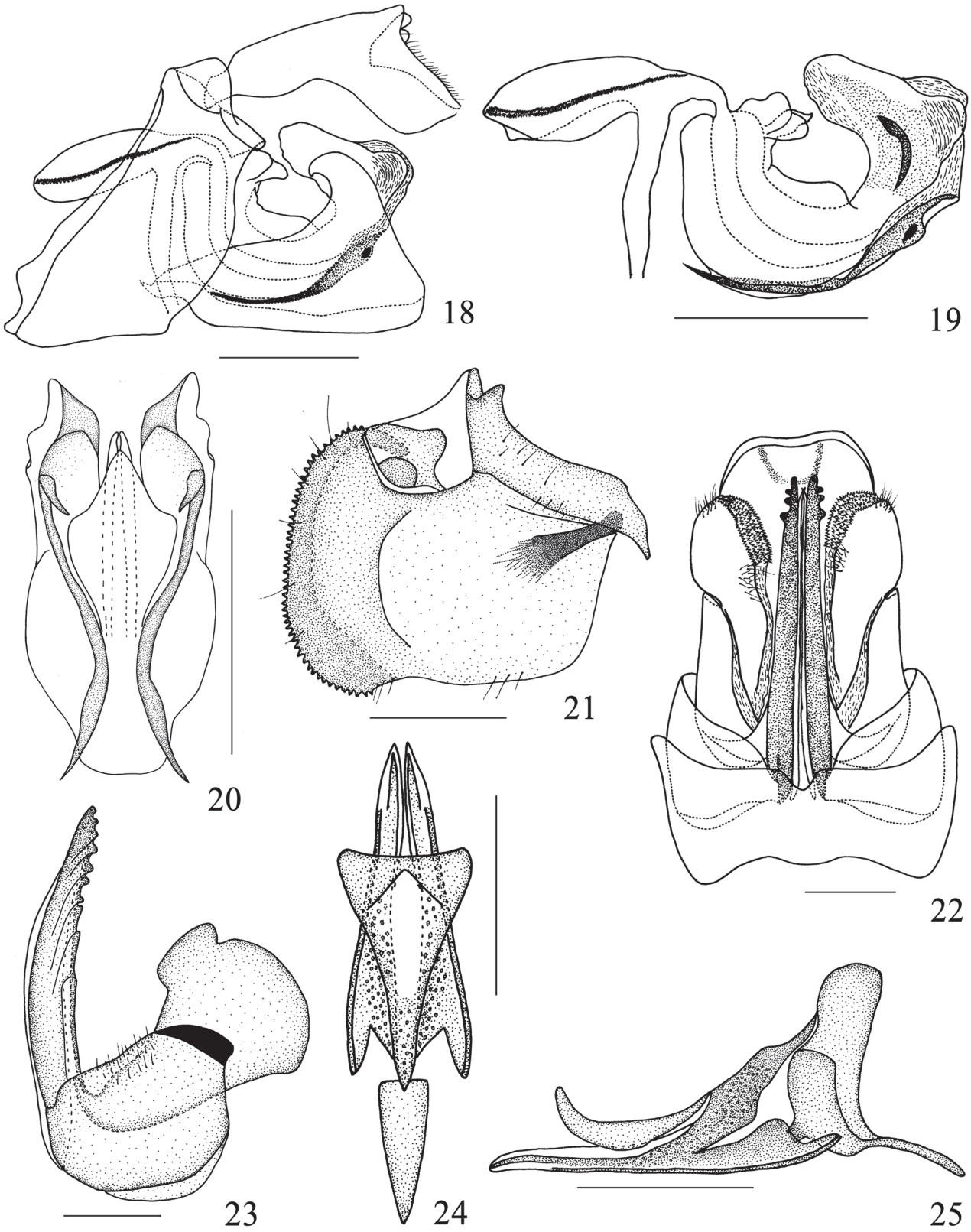
*Male terminalia*. Genital styles elongate in ventral view (Fig. 11), expanding distally, subtriangular in lateral view, with an oblique eminence on outer surface in lateral view (Fig. 12), dorsal margin concave, ventral margin almost straight, apical margin slightly oblique and straight. Capitulum broad and narrowing distally with apex terminating in a small hook (Fig. 18). Aedeagus deeply U-shaped in lateral view (Fig. 19). Dorso-lateral



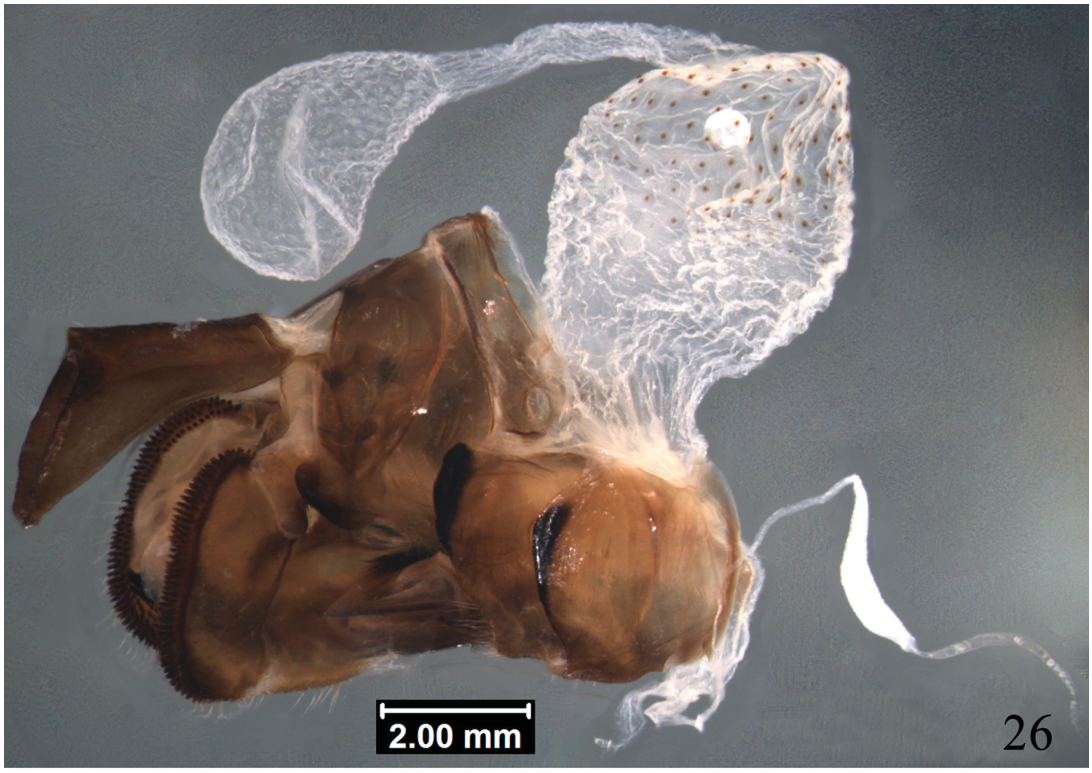

**FIGURES 1–8.** *Goniopsarites fronticonvexus* **sp. nov.** 1. adult, dorsal view; 2. adult, lateral view; 3. frons and clypeus, ventral view; 4. head and thorax, dorsal view; 5. head and thorax, lateral view; 6. frons and clypeus, latero-ventral view; 7. tegmen; 8. wing. Scale bars = 1 mm.

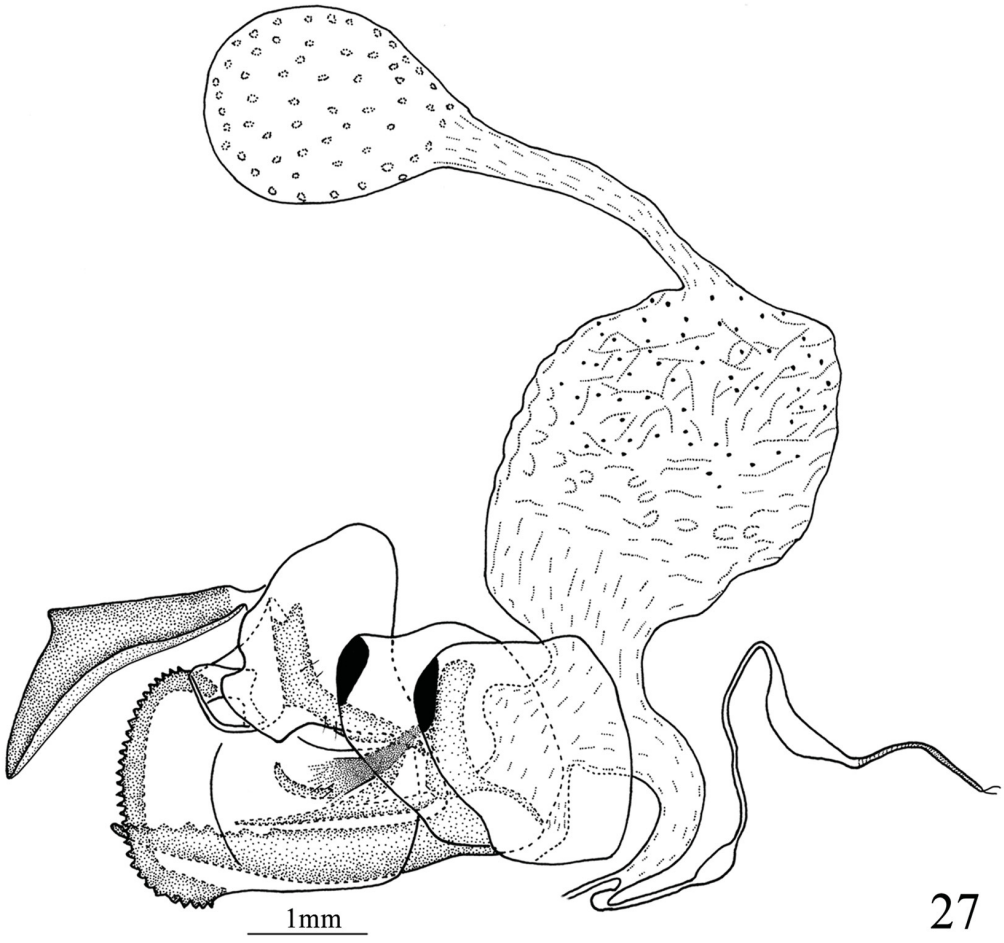



**FIGURES 9–17.** *Goniopsarites fronticonvexus* **sp. nov.** 9. hind tarsus, latero-ventral view; 10. hind tibia and tarsus, lateral view; 11. male genitalia, ventral view; 12. male genitalia, right view; 13. gonoplac, dorsal view; 14. male anal tube, dorsal view; 15. female genitalia, ventral view; 16. female genitalia, left view; 17. female anal tube, dorsal view. Scale bars = 1 mm.




**FIGURES 18–25.** *Goniopsarites fronticonvexus* **sp. nov.** 18. male genitalia, left view; 19. aedeagus, lateral view; 20. aedeagus, ventral view; 21. gonoplac, right view; 22. female genitalia, ventral view; 23. gonapophyse VIII and gonocoxa VIII, right view; 24. gonapophysis IX and gonaspiculum bridge, dorsal view; 25. gonapophysis IX and gonaspiculum bridge, right view. Scale bars = 1 mm.




**FIGURES 26–27.** *Goniopsarites fronticonvexus* **sp. nov.** 26., 27. general structure of the female reproductive organs, lateral view.

phallobase lobes strongly sclerotized, with a pair of short blade-shaped processes on lateral side; dorsal margin with large eminences extending to middle from base, ventral margin widely convex distally. Ventral phallobase lobe much shortened, bifurcated near middle. Phallus with a pair of long slender ventral processes arising laterally at middle (Fig. 19). Pygofer with posterior margin slightly convex, anterior margin oblique and shallowly concave, ventral margin straight (Figs 11, 18).

*Female terminalia*. Gonoplac rectangular in lateral view, almost as broad as long, bearing a number of minute denticles (about 5 rows) along dorsal margin to ventral margin in posterior view; median area depressed, with longitudinal carina subparallel to apical margin; third gonoplac lobes fused medially (Figs 13, 15, 16, 22). Posterior connective lamina of gonapophyses IX elongated, triangular-shaped in dorsal view; median field elevated with fused lobes in shape of "reversed triangle" (Figs 24, 25). Gonospiculum bridge large, flattened laterally, spade-shaped (Fig. 24). Gonocoxa VIII approximately square with slightly protruding hind margin (Fig. 23). Endogonocoxal process lance-shaped, narrowing apically, not furcated. Anterior connective lamina of gonapophyses VIII narrow and long, tapering distally, with 9 teeth (8 teeth with keels) (Fig. 23). Sternum VII deeply concave at middle of hind margin (Figs 15, 22).

Female internal reproductive system: Distrysian. Bursa copulatrix well-developed with two pouches; first pouch (BC1) much larger than second pouch (BC2), wall of BC1 with easily visible cells and sclerotized ornamentation; BC2 membranous with weakly visible cells and unsclerotized minutely tuberculate ornamentation; BC1 and BC2 are connected by a relatively thin membranous duct. Vagina with posterior vagina and anterior vagina, posterior vagina relatively dumpy, with a pair of semicircular processes on dorsal side; anterior vagina thin, receiving anteriorly spermatheca and ventrally common oviduct near apex. Common oviduct relatively thin. Spermatheca well-developed, comprised of five parts: orificium receptaculi (or) dilated, ductus receptaculi (dr) thin and elongate, distinctly inflated scrotiform at middle, diverticulum ductus (dvd) evidently crescentiform, pars intermedialis (spp) relatively thin with delicate spiral fold and glandula apicalis (ga) distinctly divided into two longish ducts (Figs 26, 27).

**Type material**. Holotype: male, China, **Hainan Province,** Limuling Mountain, 670m, 13 August 2009, coll. Manqiang Wang and Rui Meng.

Paratypes: 1 male, China, **Guangdong Province,** Shenzhen City, Neilingting Island; 13 June 2002, coll. Fenglong Jia; 1 female, China, **Hainan Province,** Jianfengling Mountain, 28 July 1983, coll. Jianguo Long.

**Diagnosis**. The new species differs from the closely related *Goniopsara mystica* (Melichar, 1899) in the frons forward protrude at lower part, widest at upper margin (frons flat, widest under the level of antenna in *G. mystica*); hind tibia with two lateral spines (hind tibia with three lateral spines in *G. mystica*).

**Etymology**. The specific epithet is derived from combination of Latin "frons" and "convexus", referring to the frons forward protruding.

### *Goniopsara* Metcalf, 1952

*Goniopsis* Melichar, 1899: 292 (preoccupied). Type species: *Goniopsis mystica* Melichar, 1899 by original designation.
*Goniopsara* Metcalf, 1952: 226. New name for *Goniopsis* Melichar, 1899.

**Diagnostic characters** modificated by Melichar's original description and photos of Holotype:

Head with eyes slightly narrower than pronotum (Fig. 30). Vertex obviously wider than length, with three carinae; anterior margin almost straight, posterior margin broadly concave. Frons 2.0 times as long as wide; upper margin nearly straight; lateral margin deeply concave near middle, then angularly convex under the level of antennae; with three longitudinal carinae, the lateral carinae converged downwardly and meeting with median carina before frontoclypeal suture. Frontoclypeal suture straight (Fig. 29). Clypeus with median carina; lateral margins elevate sharply (Fig. 29). Pronotum about 2.0 times as long as vertex, with median carina; anterior margin roundly convex between eyes, posterior margin broadly emarginate at median portion (Fig. 30). Mesonotum rhombus, with three longitudinal carinae (Fig. 30). Tegmina comparatively narrow; costal membrane much narrower and undeveloped with several of transverse vein; costal margin moderately convex near the middle part, weakly sinuate near apex; veins markedly prominent, veinlets obviously dense and reticulated apically; Sc+R united at base in a very short common stem, M forked at one third part from basal area, Cu bifurcated at the middle

(Figs 28, 30). Wings well-developed with three lobes (Fig. 30), R, M, CuA , Pcu and A2 veins simple; Cu furcated at middle; A1 furcated basally; M and Cu fused basally. Longitudinal veins R, M, and Cu separateed apically; about 5–6 transverse veinlets on apical region of wing. Hind tibia with three lateral spines.

**Distribution**. Singapore.

**Notes**. The genus *Goniopsara* was established by Melichar (1899) based on the species *Goniopsis mystica* from Singapore. Melichar described originally this genus is very close to the genus *Mindura* Stål and is characterized in particular by the lateral margin of frons deeply concave near middle and the very narrow costal membrane and easily distinguished from *Mindura* Stål.

### *Goniopsara mystica* (Melichar, 1899)

(Figs 28–30)

*Goniopsis mystica* Melichar, 1899: 292.
*Goniopsara mystica*: Metcalf (1952): 226.

**Diagnostic characters** modificated by Melichar's original description and photos of Holotype:

Body fusco-testaceous. Vertex about 3.7 times wider at base than median length (Fig. 30), with tricarinae robust and flavius; moderately depressed on disc and near inner side of lateral margins; lateral margins laminately ridged. Frons fusco-testaceous (Fig. 29), darkly with transverse straminoeous fascia at apex, widest just below level of antennae; lateral margin distinctly elevate with sienna color at inner margins (Fig. 29). Clypeus broadly triangular, with robust median carina, median portion particularly convex with parallel dark brown oblique sculptures (Fig. 29). Antennae development, second segment subglobse (Figs 28, 29). Pronotum relatively short (Fig. 30), disc deeply concave on sides of the median carina, with two ablique dark brown speckles. Mesonotum large, rhombus, about 2.7 times longer than the length of vertex and pronotum together; disc slightly depressed, three longitudinal carinae elevated, median carina straight, submedian carinae curved inwards near anterior margin and joined with median carina at middle of anterior margin (Fig. 30). Tegmina subtranslucent (Figs 28, 30), more than twice as long as breadth, apical margin rounded, costal membrane narrow with seven or eight bombycinous transverse veins from base to middle, with a large irregular, dark brown bloch from costal margin to about middle of tegmen, apical area generally pale infumatus; transverse veins on apical part forming a subapical line, before which irregularly scattered reticulated transverse veins, but behind which terminated at a comparatively broad apical margin; longitudinal veins forked marginally; all longitudinal veins reddish-brown at basal two-thirds (Figs 28, 30). Wings hyaline, veins and apical margin (not reaching anal area) pale infuscate (Fig. 30). Veinations of both tegmina and wing as in Fig. 28 and Fig. 30. Thorax and abdomen flavotestsceous, legs flavotestsceous (Fig. 29). Fore and mid femora of leg with two brown rings (Figs 28, 29). Hind tibia slightly enlarged at apex; lateral margins black, with three lateral spines; tarsi brown.

**Body length**: male(including tegmen): 14.0 mm (by Melichar's original description).

**Type material examined**. Holotype: male, Singapore, 1898 (examined from images only) Hungarian Natural History Museum, Budapest.

### *Pisacha* Distant, 1906

*Pisacha* Distant, 1906: 391. Type speices: *Pisacha naga* Distant, 1906, by original designation.
*Soaemis* Jacobi, 1915. Nomen nudum.
*Soaemis* Jacobi, 1916: 311. Type species: *Soaemis encaustica* Jacobi, 1916, by original designation. Synonymized by Ishihara, 1965: 207.

**Supplementary description.** Head with eyes slightly narrower than pronotum (Figs 34, 35, 40, 72, 81, 85). Vertex with median carina, disc depressed, lateral margins clearly elevated (Figs 34, 35, 40, 72, 81, 85). Frons long, lateral margins nearly parallel, slightly expanded below the level of antennae, then tapered to frontoclypeal suture; median carina disappeared near apical one-fourth to half of frons (Figs 31, 37, 41, 73, 82, 86). Clypeus narrow, triangular, with distinct yellow median carina, and with fuscous fascia on each side of mendian carina (Figs 31, 37, 41, 73, 82,

86). Frontoclypeal suture nearly straight. Rostrum elongate surpassing post trochanters, subapical segment slightly longer than apical segment. Pronotum with median carina, depressed at center and elevated laterally; anterior margin obtusely convex, almost reaching or surpassing the level of tops of eyes, posterior margin concave, both distinctly carinate, lateral lobe distinctly broadened (Figs 34, 35, 40, 72, 81, 85). Mesonotum large, almost as wide in widest part medianly as long in middle line, lateral carinae reaching or not to posterior margins (Figs 34, 35, 40, 72, 81, 85). Tegmina transparent, costal membrane narrow, Sc+R veins forked near basal cell, M vein bifurcate at basal third, Cu vein simple, between the veins with many distinct transverse veinlets at apical half, and the apical transverse veinlets forming distinct nodal line; clavus with 7–10 transverse veinlets between CuP and Pcu veins, 0–3 transverse vein between two claval veins. Legs yellow with black fascia and spots along margins, hind tibia widened at apical half and with two lateral spines.

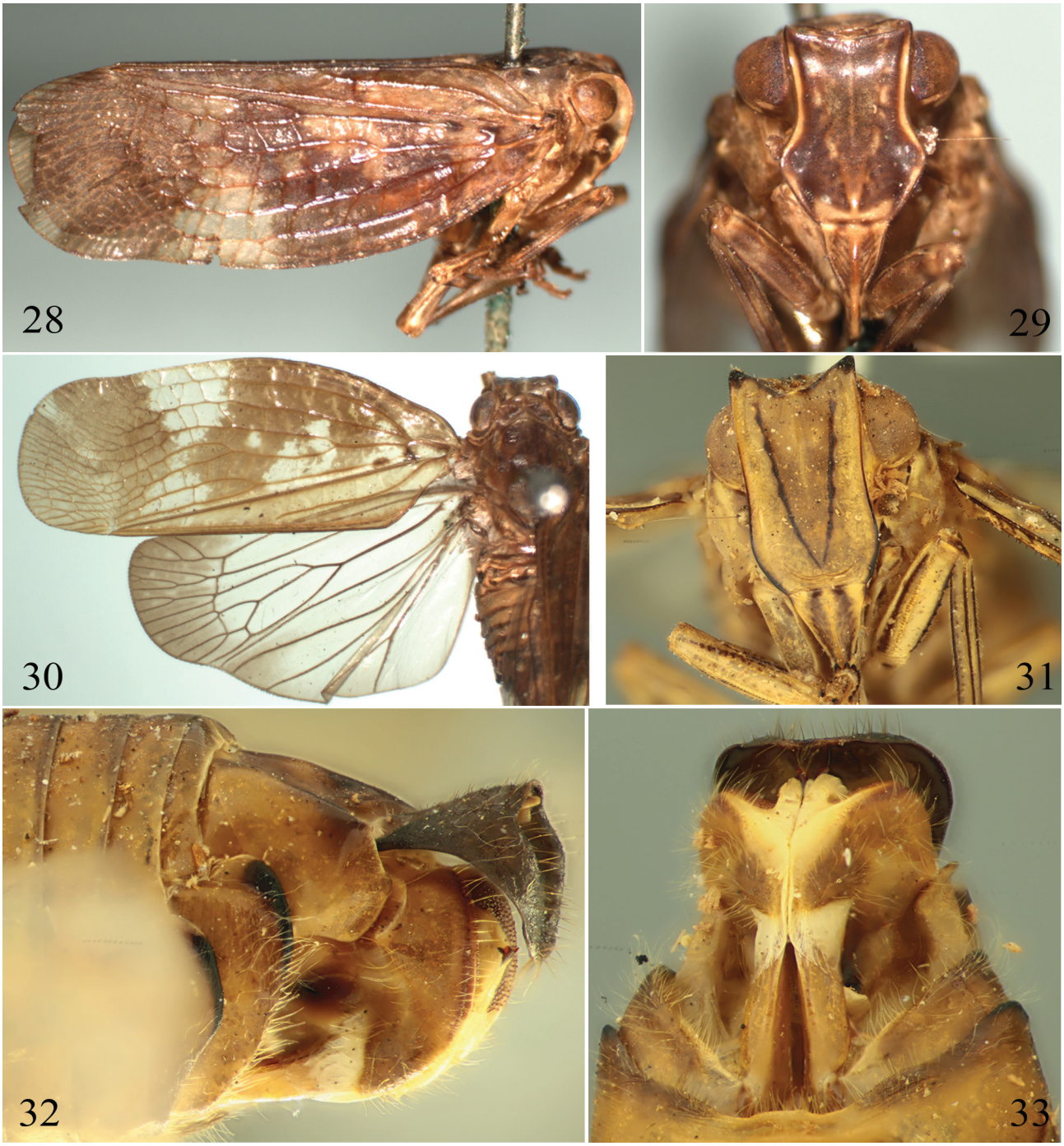
*Male terminalia*. Anal tube elongate, expended near middle in dorsal view (Figs 43, 58, 77, 88, 101), bent down near apical fourth, ventral margin sinuate in lateral view. Anal column short, located at point of flexure (Figs 42, 56, 74, 87, 100). Genital styles subtriangular in lateral view, expanding distally, posterior margin concave at middle, caudo-ventral angle strongly convex, ventral margin almost straight and dorsal margin slightly convex at basal third (Figs 42, 57, 74, 89, 100). Capitulum long, without teeth. Aedeagus U-shaped in lateral view, with large phallobase (Figs 46, 60, 78, 91, 104). Phallobase with dorso-basal portion prolonged into a pair of large processes. Dorso-lateral phallobase lobes spilt near apex, dorsum curved upward and bifurcate apically, with numbers of small spikes on each side surface or not; lateral forming into a pair of processes, bifurcate or not (Figs 46, 60, 78, 91, 104). Ventral phallobase lobe more or less round at median part, and nearly rectangular at apical part (Figs 45, 59, 76, 90, 103). Phallus with a pair of short or long ventral processes arising from apical part (Figs 46, 60, 78, 91, 104). Pygofer short and wide, anterior margin concave medianly, clearly longer than posterior margin, ventral margin oblique (Figs 42, 56, 74, 87, 100).

*Female terminalia*. Anal tube nearly oval in dorsal view (Figs 48, 61, 92, 106), bent down at midlength in lateral view (Figs 47, 64, 105). Anal column relatively long, situated at point of flexure. Gonoplac with apical half wider than basal half, apical margin obtusely convex with dorsal two-third minutely denticulate, ventral one-third membranous; basal part bearing a black sclerous structure, lying on the top of proximal part of gonapophyses IX (Figs 50, 62, 96, 110); in posterior view, apical part bearing several rows of denticles, inner margin of membranous part bearing minutely spinules (Figs 51, 66, 94, 107); the third gonoplac lobes slightly sclerotized and nearly fused at central axis (Figs 49, 63, 93, 108). Posterior connective lamina of gonapophyses IX elongated, triangular-shaped; median field sclerous, with fused lobe nearly quadrate (Figs 52, 54, 65, 68, 95, 98, 111, 112). Gonospiculum bridge large, spade-shaped (Figs 52, 65, 98, 111). Gonocoxa VIII approximately square with hind margin slightly protruding. Endogonocoxal process narrowing apically, not furcated. Anterior connective lamina of gonapophyses VIII narrow, tapering apically, with a row of teeth along outer margin (Figs 55, 69, 97, 113). Sternum VII with posterior margin sinuate, middle part quite lower than two sides (Figs 33, 53, 67, 99, 109).

**Distribution**. Indian, China (Taiwan, Guangxi, Hainan, Zhejiang, Chongqing, Sichuan), Vietnam.

## Key to species of *Pisacha* Fennah

1. Tegmina transparent, with two fuscous markings ..... 2
-. Tegmina transparent, without any stripe ..... 3
2. Frons with median carina pale yellow ..... *P. naga* Distant, 1906
-. Frons with median carina black ..... *P. yinggensis* **sp. nov.**
3. Costal membrane of tegmen with 9 or 10 short transverse veinlets widened into bands ..... *P. balteiformis* **sp. nov.**
-. Costal membrane with transverse veinlets not widened ..... 4
4. Frons with "V" lateral carinae unclear but incrassate at base ..... *P. kwangsiensis* Chou et Lu, 1977
-. Frons with "V" lateral carinae have uniform thickness ..... 5
5. Vertex with anterior margin acutely convex medianly ..... *P. baculiformis* **sp. nov.**
-. Vertex with anterior margin slightly obtusely convex or straight ..... 6
6. Vertex with anterior margin slightly obtusely convex, mesonotum with lateral carinae surpassing apical half ..... *P. falcata* **sp. nov.**
-. Vertex with anterior margin straight, mesonotum with lateral carinae obsolete at apical fifth ..... *P. encaustica* (Jacobi, 1916), comb. nov. & stat. rev.




**FIGURES 28–33.** *Goniopsara mystica* (Melichar, 1899) 28. adult, lateral view; 29. frons and clypeus, ventral view; 30. adult, dorsal view. *Pisacha naga* Distant, 1906 31. frons and clypeus, ventral view; 32. female genitalia, left view; 33. female genitalia, ventral view.

### ***Pisacha naga*** **Distant, 1906**

(Figs 31–34)

*Pisacha naga* Distant, 1906: 392.

**Supplementary description.** Female anal tube in lateral view bent down near midlength. Anal column short (Fig. 32). Gonoplacs bearing several rows of minute denticles (Fig. 32). Sternum VII with posterior margin convex in middle (Fig. 33).

**Type material examined.** Holotype: female, Indian, Assam, Naga Hills, 1906, coll. Distant (examined from images only) Natural History Museum, London, England.

### *Pisacha encaustica* (Jacobi, 1916) comb. nov. & stat. rev.

*Soaemis encaustica* Jacobi, 1916: 311; Melichar, 1923: 168.
*Pisacha naga* Distant, 1906: Ishihara, 1965: 207; Wu and Yang, 1989: 166, fig. 3.

**Notes**. The species *Pisacha encaustica* (Jacobi, 1916) was firstly described according to one male specimen from Taiwan. Subsequently, it was mistakenly placed as synonym of *P. naga* by Ishihara (1965) and also misidentified as *P. naga* by Wu and Yang (1989). The species *P. encaustica* is clearly different from *P. naga* (Figs 31–34) by the tegmina without any mark, mesonotum without wide black stripe along lateral carina and frons with median carina present at basal fourth, in *P. naga*, tegmina with two black stripes, mesonotum with wide black stripe along transverse carina and lateral carina, median carina present at basal half. Conversely, it is very similar to *P. kwangsiensis* (Figs 35–37), but can be easily distinguished from the latter by 1) dorso-basal portion of phallobase with apico-ventral angle blunt in lateral view (Wu and Yang, 1989, Fig. 3F), in *P. kwangsiensis*, dorso-basal portion of phallobase with apico-ventral angle sharp (Fig. 46); 2) dorso-lateral phallobase lobes with doral margin smooth, and lateral apex forming into a pair of bifurcate processes, the two branches have equal length, in *P. kwangsiensis*, dorsal margin of dorso-lateral phallobase lobes with a pair of small triangular processes at middle, the apical bifurcate processes with upper branch about half length of the under branch; 3) phallus with a pair of shallowly curved short processes, apex directed caudad (Wu & Yang, 1989, Fig. 3G), in *P. kwangsiensis*, phallus with a pair of deeply curved hooks backward, apex directed dorsally (Fig. 46); 4) sternum VII with posterior margin slightly convex medianly (Wu & Yang, 1989, Fig. 3H), in *P. kwangsiensis*, sternum VII with posterior margin slightly concave in middle (Fig. 53).

### *Pisacha kwangsiensis* Chou et Lu, 1977
(Figs 35–37, 42–55, 114, 119)

*Pisacha kwangsiensis* Chou et Lu, 1977: 317; 1985: 101.

**Supplementary description.** Head with eyes slightly narrower than pronotum (Fig. 35). Vertex 3.6 times wider than long in middle line, anterior margin acutely convex medianly, and posterior margin deeply concave; median carina wide, offwhite (Figs 35, 36). Frons longer than wide in widest part about 1.6 times; upper margin deeply concave, median carinae short, presented at apical fourth, pale yellow, "V" lateral carinae pale black and darkened at base, with about 5 obscure black spots along lateral carinae (Fig. 37). Clypeus triangular, median carina pale yellow (Fig. 37). Pronotum about 2.0 times longer than vertex in middle line; anterior margin convex between eyes, almost reaching the level of tops of eyes (Fig. 35). Mesonotum large, 2.8 times as long as vertex and pronotum in middle line (Fig. 35). Tegmina transparent, clavus with 7–10 transverse veinlets between CuP and Pcu veins, 0–3 transverse vein between two claval veins (Fig. 36). Spinulation formula of hind leg 13–12–2.

*Male terminalia*. Anal tube with ventral margin sinuate in lateral view; 2.5 times longer than widest part at middle, apical margin slightly convex (Figs 42, 43). Dorso-basal processes of phallobase hammer-shaped, apico-ventral angles sharp in lateral view. Dorso-lateral phallobase lobes with a pair of small triangular processes on dorsal margins at middle, dorsum with about 60 small spikes on each side surface; lateral apical bifurcate processes with upper branches about half length of the under branches. Ventral phallobase lobe strongly sclerous, apical margin nearly straight (Figs 45,119). Phallus with a pair of deeply curved hooks backward directed dorsally near apex (Figs 46, 114). Pygofer with posterior margin slightly convex near dorsal third (Fig. 42).

*Female terminalia*. Anal tube with apical margin obtusely convex (Fig. 48). Gonoplac bearing about 6–7 rows of denticles in posterior view (Fig. 51). Anterior connective lamina of gonapophyses VIII with 10 teeth (Fig. 55). Sternum VII with posterior margin slightly concave at middle (Fig. 53).

**Type material examined**. Holotype: male, China, **Guangxi Zhuangzu Autonomous Region,** Longsheng County, Sanmen Town, 20 August 1964, coll. Shengli Liu.

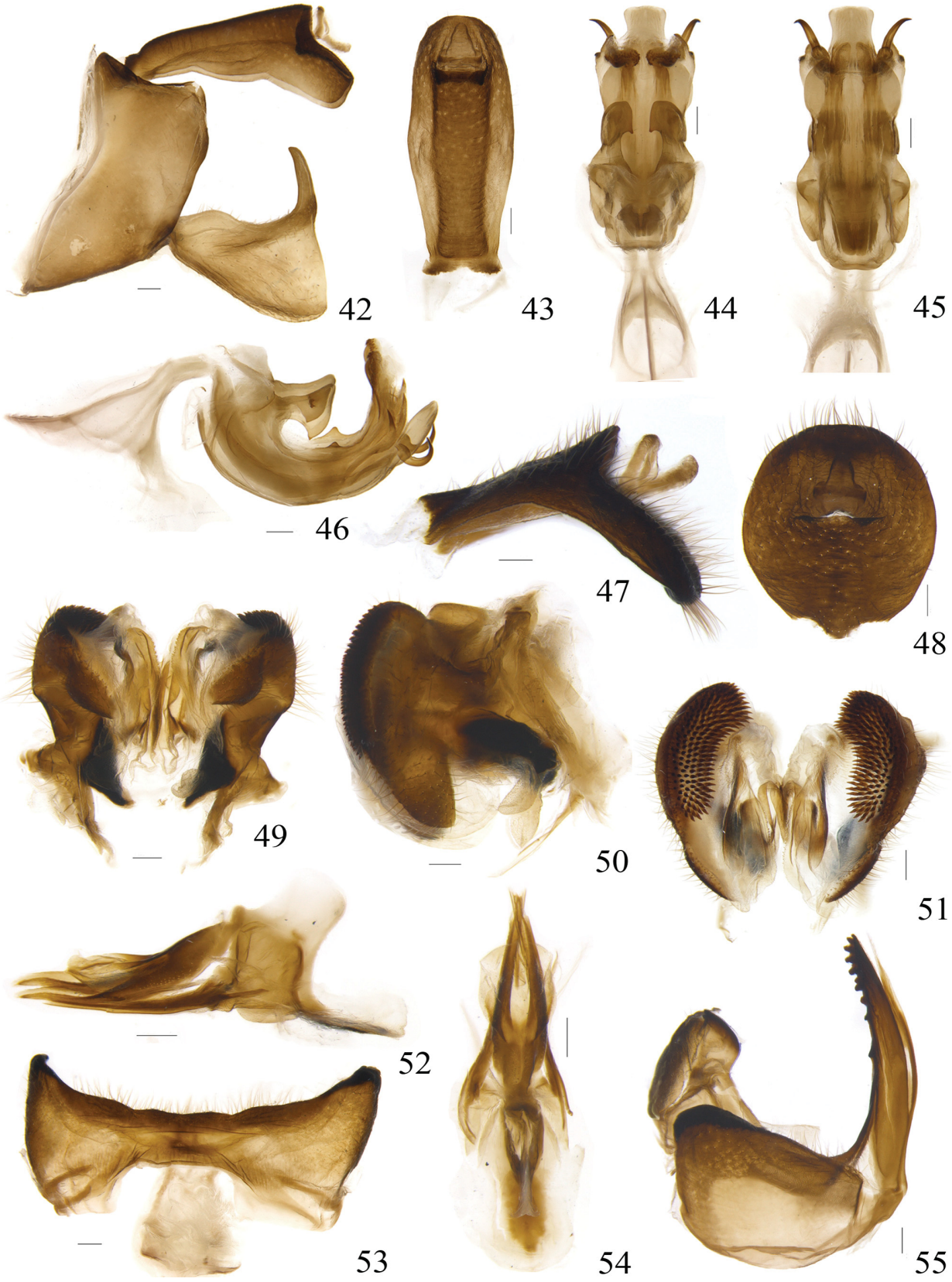








**FIGURES 34–41.** *Pisacha naga* Distant, 1906, 34. adult, dorsal view. *Pisacha kwangsiensis* Chou *et* Lu 1977 35. head and thorax, dorsal view; 36. adult, dorsal view; 37. frons and clypeus, ventral view. *Pisacha yinggensis* **sp. nov.** 38. adult, dorsal view; 39. adult, lateral view; 40. head and thorax, dorsal view; 41. frons and clypeus, ventral view. Scale bars = 1 mm.




**FIGURES 42–55.** *Pisacha kwangsiensis* Chou *et* Lu 1977 42. male genitalia, left view; 43. male anal tube, dorsal view; 44. aedeagus, dorsal view; 45. aedeagus, ventral view; 46. aedeagus, lateral view; 47. female anal tube, lateral view; 48. female anal tube, dorsal view; 49. gonoplac, ventral view; 50. gonoplac, right view; 51. gonoplac, posterior view; 52. gonapophysis IX and gonaspiculum bridge, right view; 53. sternum VII, ventral view; 54. gonapophysis IX and gonaspiculum bridge, dorsal view; 55. gonapophyse VIII and gonocoxa VIII, left view. Scale bars = 0.2 mm.

Paratypes: 1 female, China, **Guangxi Zhuangzu Autonomous Region,** Longzhou City, Nonggang National Nature Reserve, May 1980, coll. Zhuyin Wang; 1 female, China, **Guangxi Zhuangzu Autonomous Region,** Longzhou City, Nonggang National Nature Reserve, 20 May 1983, coll. Jikun Yang.

***Pisacha yinggensis* sp. nov.**
(Figs 38–41, 56–69, 115, 120)

**Description.** Length, male (N=2) (including tegmen): 11.6–12.0 mm, length of tegmen: 9.9–10.2 mm; female (N=2) (including tegmen):13.2–13.4 mm, length of tegmen: 11.3 mm.

General color dark-brown. Vertex rufous with median carinae pale yellow. Frons yellow, median area with light black marks, lateral area with obscure light black dots, three central carinae and margins black. Clypeus yellow, median carina luminous yellow. Ocelli red. Eyes grey. Antenna tawny, pedicel with sensilla white. Gena yellowish-brown with a black spot on apical angle. Pronotum fuscous, median carinae pale yellow. Mesonotum dark brown medianly, pale fulvous laterally, median carina pale yellow, lateral carina and its outside black. Tegmina transparent, venation dark brown, with a black oblique broad stripe near apical third from costal margin to about middle of tegmen, apex with broadly fuscous stripe.

Vertex 4.0 times wider than long in middle line, each basal lateral angle with a semicircle depression, anterior margin sinuate and emarginate at middle, posterior margin concave (Figs 38, 40). Frons long, 1.5 times longer than wide in mid line, widest at upper margin; upper margin concave, median carina distinct, disappeared near middle (Fig. 41). Pronotum about 1.6 times longer than vertex in middle line; anterior margin obtusely convex, surpassing the level of upper points of eyes; disc wrinkled near anterior margin (Fig. 40). Mesonotum large, 3.0 times as long as vertex and pronotum combined in middle line (Fig. 40). Tegmina transparent, clavus with 7–9 transverse veinlets between the suture and its longitudinal vein, one or no transverse vein between two claval veins. Spinal formula of hind leg 11–9–2.

*Male terminalia*. Anal tube with ventral margin acutely concave near apical fourth in lateral view (Fig. 56); 2.0 times longer than widest part at middle in dorsal view, apical margin almost straight (Figs 58). Phallobase with dorso-basal processes short (Figs 60, 115), but apical half spilt into two small rectangular lobes. Dorso-lateral phallobase lobes with dorsum bifurcate near apex and membranous, with numerous spikes on the surface before bifurcation; lateral apices forming into a pair of short processes, not bifurcate (Figs 60, 115), lateral sides have a pair of small mammillary processes near apical one-third (Figs 59, 120). Ventral phallobase lobe slightly sclerous and pigmented with apical margin nearly straight (Figs 59, 120). Phallus with a pair of long and thin processes directed cephalad, the processes crossed in ventral view (Figs 59, 120). Pygofer with posterior margin convex near dorsal third (Fig. 56).

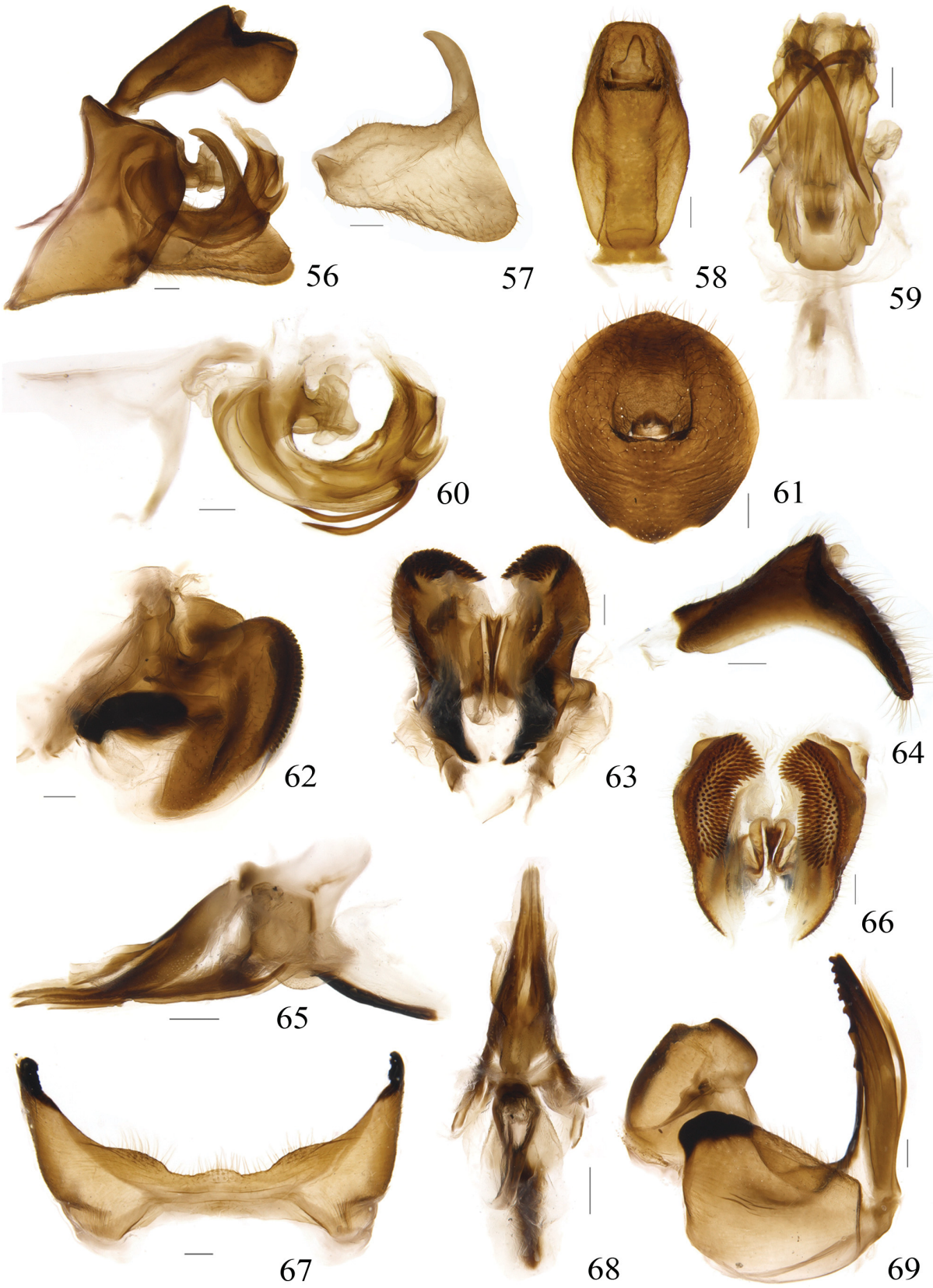
*Female terminalia*. Anal tube nearly peach-shaped in dorsal view, apical margin angular medianlly (Fig. 61). Gonoplac bearing about 10–11 rows of denticles in posterior view (Fig. 66). Anterior connective lamina of gonapophyses VIII with 9 teeth (Fig. 69). Sternum VII with posterior margin convex medianly (Fig. 67).

**Type material**. Holotype: male, China, **Hainan Province,** Yinggeling Mountain, N 19º 03' 047", E 109º 33' 782", 678m, 21 August 2010, coll. Guo Zheng.

Paratypes: 1 female, same data as holotype; 1 female, China, **Hainan Province,** Yinggeling Mountain, N 19º 02' 884", E 109º 53' 529", 22 August 2010, coll. Guo Zheng; 1 male, China, **Hainan Province**, Yinggeling Mountain, N 19º 03' 049", E 109º 33' 751", 693m, 25 August 2010, coll. Guo Zheng.

**Diagnosis**. This species looks similar to *P. naga* by the similar stripes on the tegmina, but can be differentiated from it by the following features: 1) vertex 4.0 times wider than long in middle line, anterior margin sinuate and emarginate at middle, median carina narrow, in *P. naga*, vertex about 3.5 times wider than long in middle line, anterior margin somewhat convex, median carina relatively wide; 2) pronotum with anterior margin obtusely convex, disc wrinkled near anterior margin; in *P. naga*, anterior margin strongly convex, without wrinkle; 3) mesonotum with anterior margin relatively convex between eyes, apex reaching to middle of the level of eyes, with wide black stripe only along lateral carina; in *P. naga*, mesonotum with anterior margin slightly convex between eyes, apex not reaching to one third of the level of eyes, wide black stripe present at transverse carina and lateral carina; 4) frons with median carina black, in *P. naga*, median carina white.

**Etymology.** The specific name refers to the locality, Yinggeling Mountain.




**FIGURES 56–69.** *Pisacha yinggensis* **sp. nov.** 56. male genitalia, left view; 57. genital style, left view; 58. male anal tube, dorsal view; 59. aedeagus, ventral view; 60. aedeagus, lateral view; 61. female anal tube, dorsal view; 62. gonoplac, right view; 63. gonoplac, ventral view; 64. female anal tube, lateral view; 65. gonapophysis IX and gonaspiculum bridge, right view; 66. gonoplac, posterior view; 67. sternum VII, ventral view; 68. gonapophysis IX and gonaspiculum bridge, dorsal view; 69. gonapophyse VIII and gonocoxa VIII, left view. Scale bars = 0.2 mm.

***Pisacha baculiformis* sp. nov.**
(Figs 70–78, 116, 121)

**Description.** Length, male (N=1) (including tegmen): 13.8 mm, length of tegmen:12.0 mm; female (N=1) (including tegmen):15.0 mm, length of tegmen: 12.9 mm.

General color brown. Vertex dark brown, median carinae and lateral margins pale yellow. Frons yellow, median area somewhat dark brown, lateral area with numbers of dark brown dots, median carina pale yellow, lateral carinae and margins black, with six small spots along lateral carinae, apical angles black, near upper margin with two black spots. Clypeus yellow, median carina yellow. Ocelli red. Eyes black brown. Antenna dark brown. Gena light brown, with a big black mark at apical angle and a dark brown mark at middle. Pronotum brown, pale yellow. Mesonotum fuscous at median area, light brown laterally, median carina pale yellow, and lateral carinae black. Tegmina transparent, slightly yellow, venation dark brown.

Vertex 3.2 times wider than long in middle line, anterior margin angularly convex, posterior margin obtusely concave (Figs 70, 72). Frons long, 1.4 times longer than wide at widest part; upper margin angularly concave, median carina indistinct, disappeared near apical one-third (Fig. 73). Pronotum about 1.4 times longer than vertex in middle line; anterior margin obtusely convex, almost reaching the level of top of eye (Fig. 72). Mesonotum large, 2.7 times as long as vertex and pronotum combined in middle line, lateral carinae almost reaching posterior margins (Fig. 72). Tegmina transparent, clavus with 7 transverse veinlets between the suture and its longitudinal vein, one transverse veinlet between two claval veins. Spinal formula of hind leg 13(11)–11–2.

*Male terminalia*. Anal tube relatively narrow in dorsal view, 2.6 times longer than widest part, apical margin weakly convex, with ventral margin slightly sinuate (Figs 74, 77). Phallobase with dorso-basal portion elongate, baculiform, deflexed near apex. Dorso-lateral phallobase lobes with a pair of long vertical clavate processes on dorsal margins near middle, apical portion strongly sclerotized and short in lateral view, with about 35 small spikes on each side surface; lateral sides with a pair of bifurcate processes, upper branches tiny and under branches relatively long and thick (Figs 75, 78, 116). Ventral phallobase lobe round and small at median part, apical portion long, nearly rectangular, apical margin weakly concave medianly (Figs 76, 121). Phallus with a pair of short processes directed cephalad, but curved deflexed near middle, two processes far away from each other in ventral view (Figs 76, 78, 116, 121). Pygofer with posterior margin distinctly convex at middle (Fig. 74).

**Type material**. Holotype: male, China, **Zhejiang Province,** Qingliangfeng Mountain, 450m, 9 August 2008, coll. Lei Zhang.

Paratypes: 1 female, China, **Zhejiang Province,** Baishanzu nature reserve, Wulingkeng Mountain, 567m, 13 August 2003, coll. Dai Wu, collected by light trap.

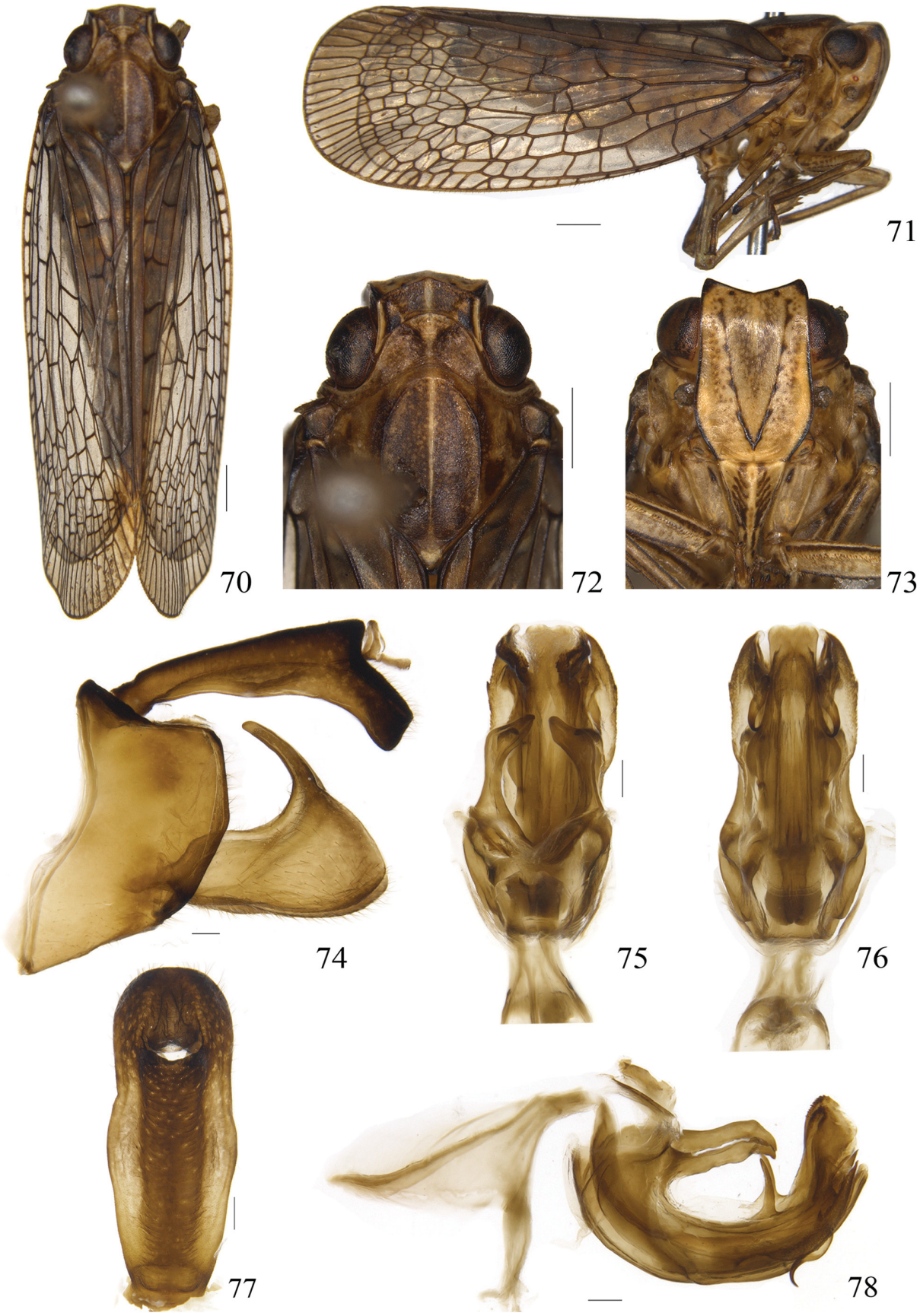
**Diagnosis**. This species is similar to *P. kwangsiensis* by vertex with anterior margin angularly convex and tegmina transparent without any stripe, but can be differentiated from it by the following features: 1) frons 1.4 times longer than wide at widest part; median carina indistinct, disappeared near apical one-third, "V" lateral carinae clear, with 6 clear black spots along lateral carinae, in *P. kwangsiensis*, frons longer than wide in widest part about 1.6 times; median carinae clear, presented at apical fourth, "V" lateral carinae unclear but darkened at base, with 5 obscure black spots along lateral carinae; 2) the processes of phallobase lobes and phallus is quite different between these two species, it can be seen from Figs 44–46 and Figs 75, 76, 78.

**Etymology.** The specific epithet derived from the Latin "baculiformis", referring to dorso-basal processes of phallobase baculiform in lateral view.

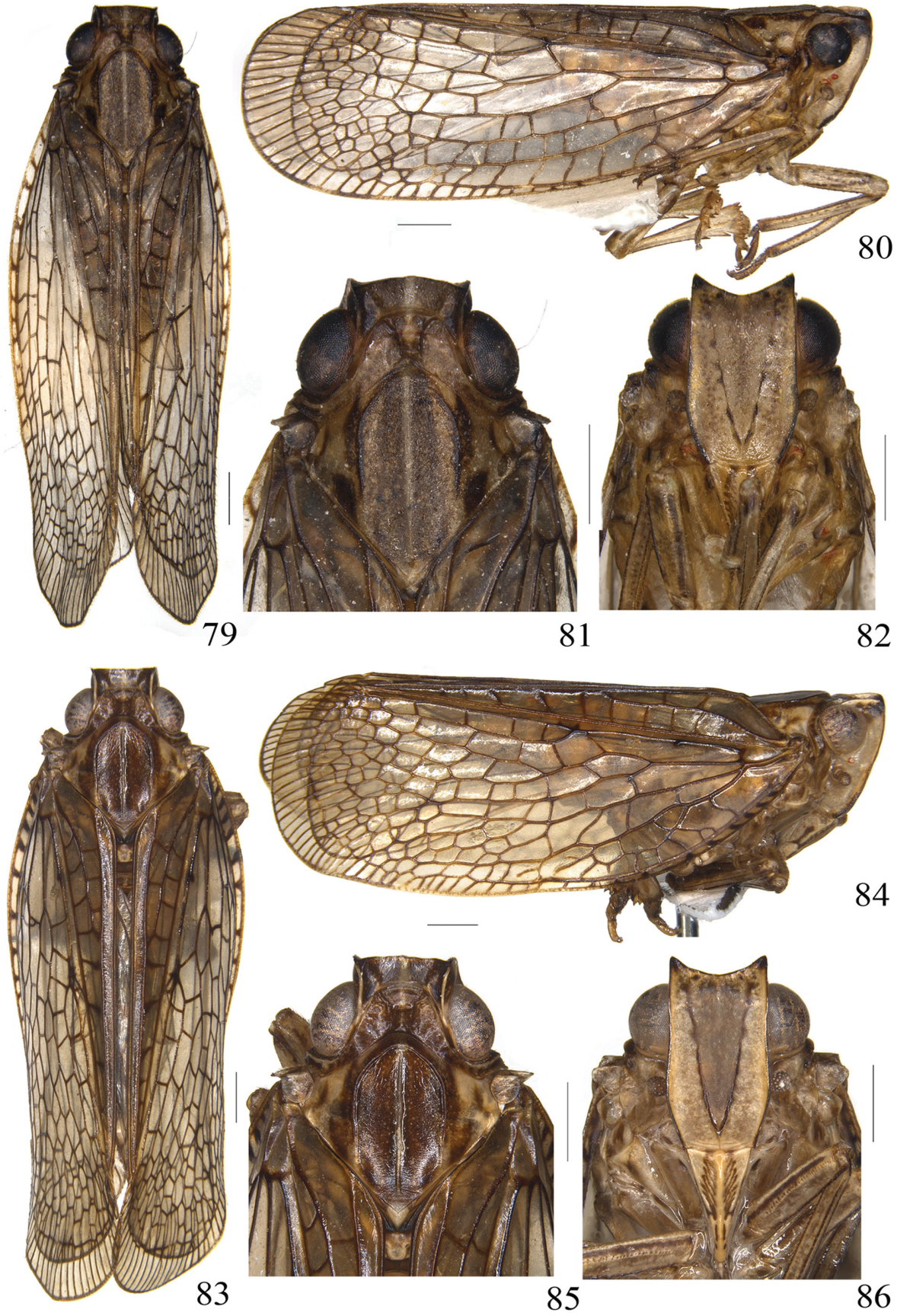
***Pisacha falcata* sp. nov.**
(Figs 79–82, 87–99, 117, 122)

**Description.** Length, male (N=1) (including tegmen): 12.3 mm, length of tegmen: 10.5 mm; female (N=2) (including tegmen):13.2–13.4mm, length of tegmen: 11.8–12.0 mm.

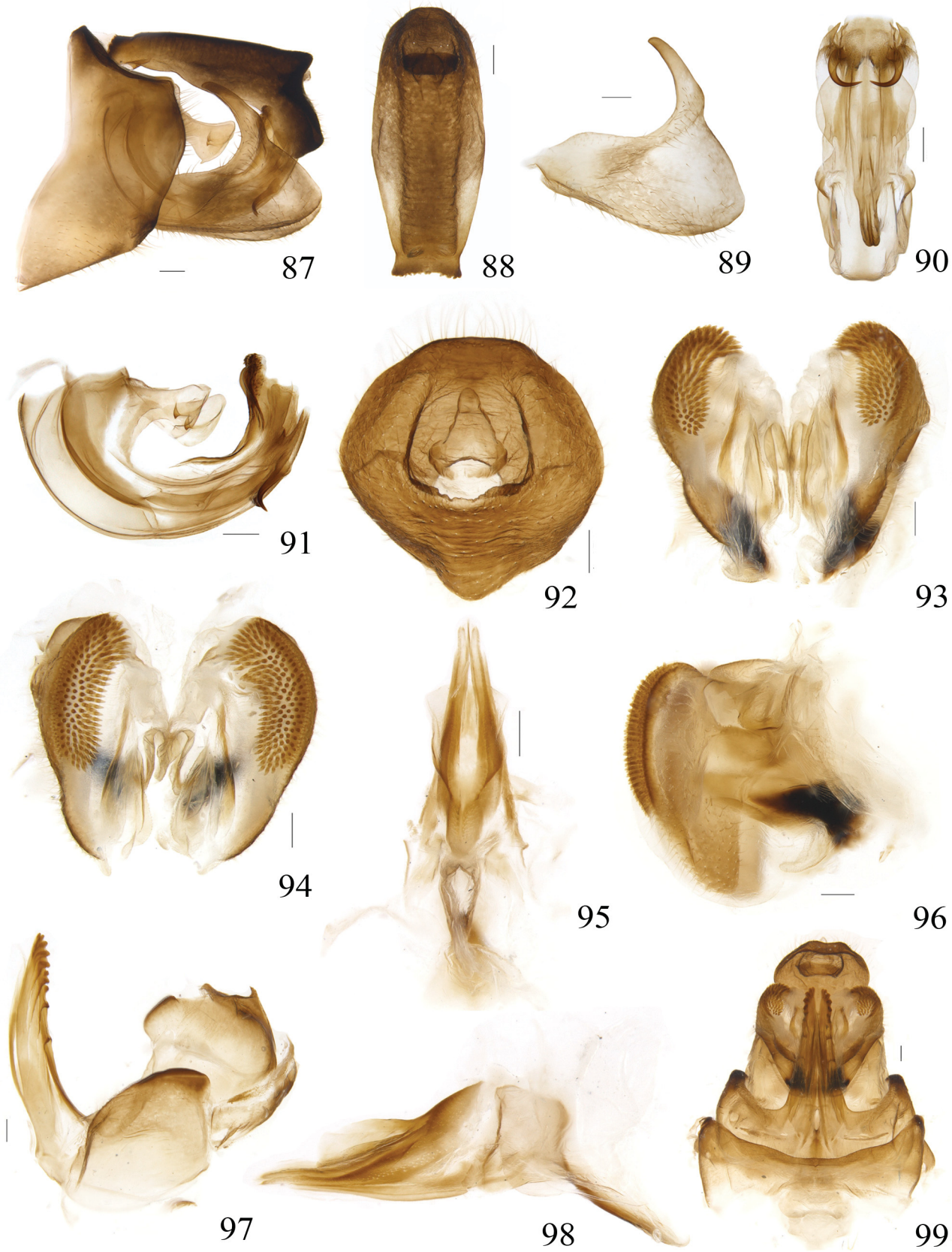
General color fulvous. Vertex dark brown with median carinae canescent. Frons brown, lateral area with obscure dark brown dots, median carina pale yellow, lateral carinae and margins black brown, apical angles black brown, near upper margin with two black spots. Clypeus brown, median carina brown, with several oblique short fuscous stripes on each side of median carina. Ocelli red. Eyes black brown. Antenna tawny, pedicel with sensilla




**FIGURES 70–78.** *Pisacha baculiformis* **sp. nov.** 70. adult, dorsal view; 71. adult, lateral view; 72. head and thorax, dorsal view; 73. frons and clypeus, ventral view. 74. male genitalia, left view; 75. aedeagus, dorsal view; 76. aedeagus, ventral view; 77. male anal tube, dorsal view; 78. aedeagus, lateral view;




**FIGURES 79–86.** *Pisacha falcata* **sp. nov.** 79. adult, dorsal view; 80. adult, lateral view; 81. head and thorax, dorsal view; 82. frons and clypeus, ventral view. *Pisacha balteiformis* **sp. nov.** 83. adult, dorsal view; 84. adult, lateral view; 85. head and thorax, dorsal view; 86. frons and clypeus, ventral view. Scale bars = 1 mm.




**FIGURES 87–99.** *Pisacha falcata* **sp. nov.** 87. male genitalia, left view; 88. male anal tube, dorsal view; 89. genital style, left view; 90. aedeagus, ventral view; 91. aedeagus, left view; 92. female anal tube, dorsal view; 93. gonoplac, ventral view; 94. gonoplac, posterior view; 95. gonapophysis IX and gonaspiculum bridge, dorsal view; 96. gonoplac, right view; 97. gonapophyse VIII and gonocoxa VIII, right view; 98. gonapophysis IX and gonaspiculum bridge, right view; 99. female genitalia, ventral view. Scale bars = 0.2 mm.

grey. Gena light brown with a big black mark on apical angle. Pronotum dark brown, median carinae pale offwhite. Mesonotum fuscous at median area, pale fulvous laterally, median carina canescent, lateral carina and and its outside black. Tegmina transparent, venation dark brown.

Vertex 3.4 times wider than long in middle line, anterior margin slightly obtusely convex, posterior margin strongly concave (Figs 79, 81). Frons long, 1.5 times longer than wide at widest part; upper margin deeply concave, median carina indistinct, disappeared near apical one-third (Fig. 82). Pronotum about 1.9 times longer than vertex in middle line, anterior margin obtusely convex, reaching the level of upper points of eyes, posterior margin angularly concave (Figs 79, 81). Mesonotum large, 3.0 times as long as vertex and pronotum combined in middle line, lateral carinae not reaching posterior margins, present at about apical two-thirds (Fig. 81). Tegmina transparent, clavus with 7–8 transverse veinlets between the suture and its longitudinal vein, 0–2 transverse veinlets between two claval veins (Fig. 79). Spinal formula of hind leg 11–11–2.

*Male terminalia*. Anal tube with ventral margin sinuate; 2.3 times longer than widest part in dorsal view, apical margin obtusely convex (Figs 87, 88). Phallobase with dorso-basal portion expanding apically, apico-ventral angles sharp. Dorso-lateral phallobase lobes with apical portion have about 40 small spikes on each side surface; lateral apex with a pair of short bifurcate processes, upper branches very small, about one fifth of the under branches. Ventral phallobase lobe with apical portion nearly square, apical margin straight (Figs 90, 91,117, 122). Phallus with a pair of short processes directed cephalad, but deflexed near apex, and two processes nearly falcate with tip points to each other in ventral view (Figs 90, 91, 117, 122). Pygofer with posterior margin distinctly convex near dorsal third (Fig. 87).

*Female terminalia*. Anal tube nearly round in dorsal view, apical margin weakly convex. Anal column relatively long (Fig. 92). Gonoplac bearing about 6–7 rows of denticles in posterior view (Fig. 94). Anterior connective lamina of gonapophyses VIII with 10 teeth (Fig. 97). Sternum VII with posterior margin weakly convex medianly (Fig. 99).

**Type material**. Holotype: male, China, **Chongqing Municipality,** Jinyunshan Mountain, 18 July 2011, coll. Menglin Wang.

Paratypes: 1 female, China, **Sichuan Province,** Wenchuan County, Yingxiu Town, 1000m, 15 September 1983, coll. Xuezhong Zhang; 1 female, China, **Sichuan Province,** Emei Mountain, 800 –1000m, 14 September 1957, coll. Youcai Lu.

**Diagnosis**. This species is different from all other species in this genus by 1) mesonotum with lateral carinae present at about apical two-thirds; 2) dorso-lateral phallobase lobes with apical portion have about 40 small spikes on each side surface; lateral sides with a pair of short bifurcate processes, upper branches very small, about one fifth of the under branches; 3) phallus with the ventral hooks short, directed cephalad, but deflexed near apex, and two hooks nearly falcate with tips point to each other in ventral view.

**Etymology.** The specific epithet derived from the Latin “falcata”, referring to ventral hooks of phallus falcate in ventral view.

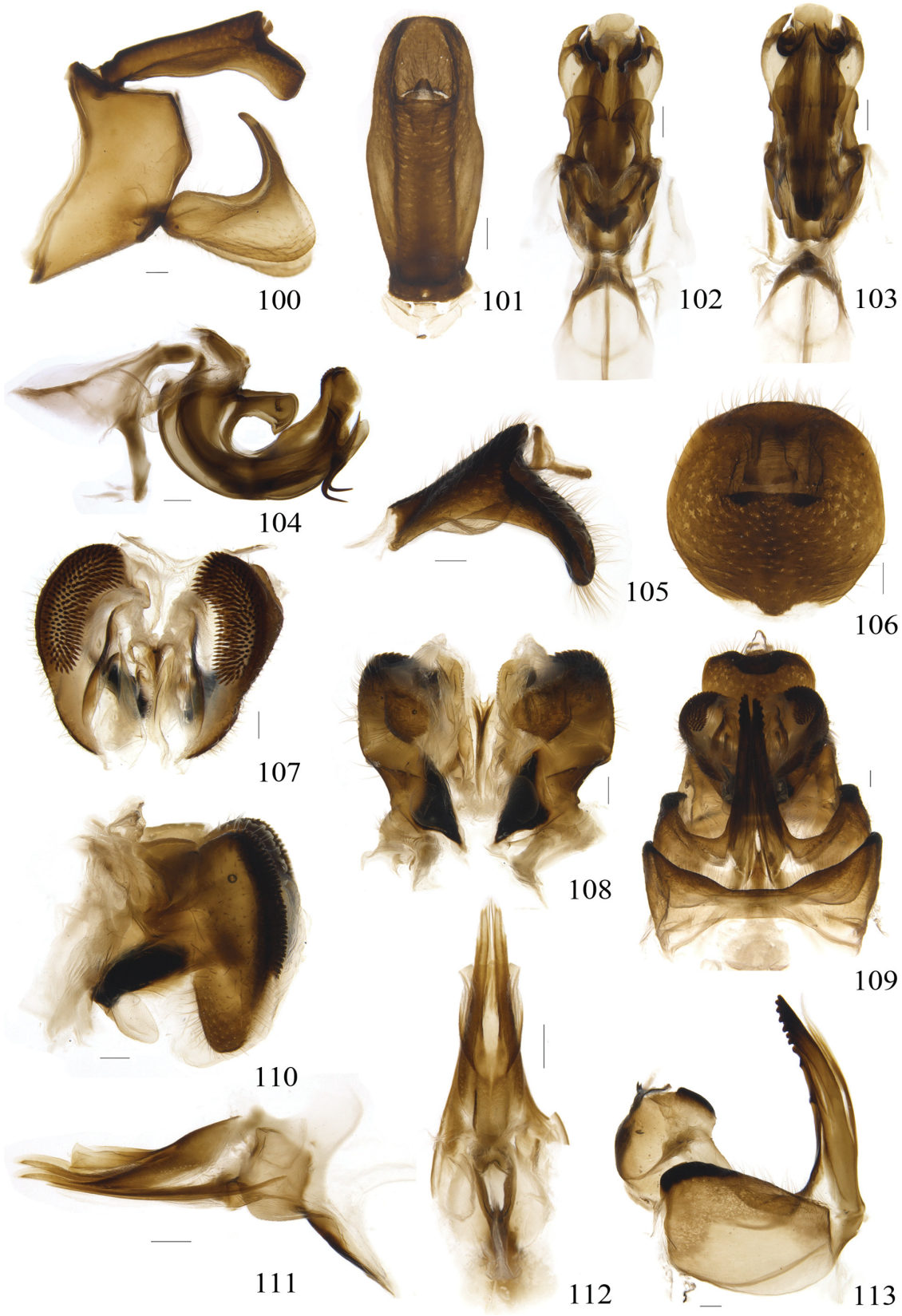
### ***Pisacha balteiformis*** **sp. nov.**

(Figs 83–86, 100–113, 118, 123)

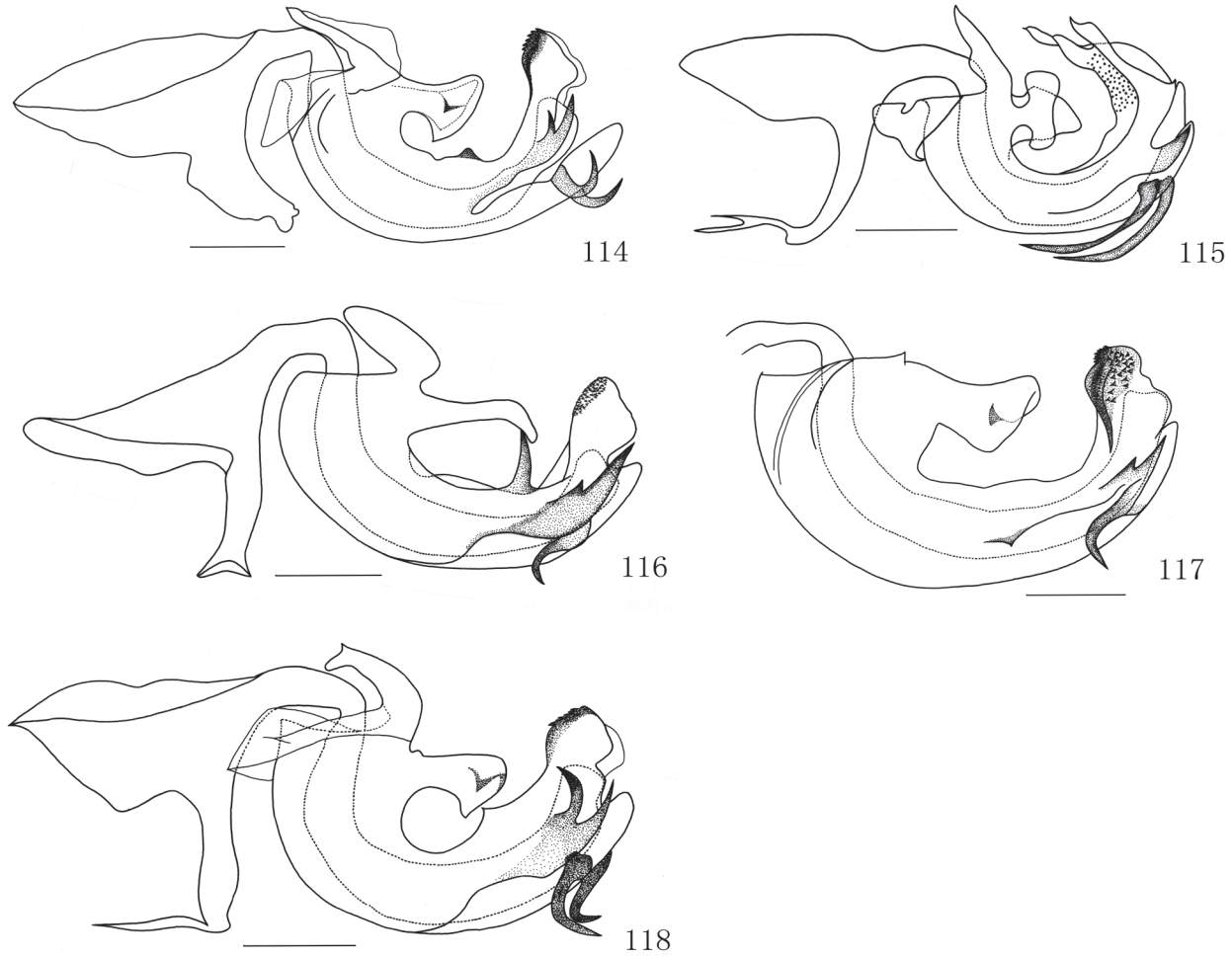
**Description.** Length, male (N=2) (including tegmen): 12.8–13.2 mm, length of tegmen: 11.6–12.0 mm; female (N=3) (including tegmen):14.8 –15.2 mm, length of tegmen: 13.4–13.6 mm.

General color fulvous, shiny. Vertex testaceous, median carinae and lateral margins yellowish white. Frons with median area dark brown and light brown, median carina canescent, lateral carinae and margins black, apical angles black, near upper margin with two black spots. Clypeus light brown, median carina yellow, with several oblique short fuscous stripes on each side of median carina. Ocelli red. Eyes black brown with yellow stripes. Antenna tawny, pedicel with sensilla white. Gena light brown with a big black mark on apical angle. Pronotum testaceous, median carinae yellowish white. Mesonotum testaceous at median area, pale yellow laterally, three carinae dark brown. Tegmina transparent, venation dark brown, costal membrane with 9 or 10 transverse veinlets black, widened into short bands.

Vertex 3.2 times wider than long in middle line, anterior margin almost straight, posterior margin obtusely concave (Figs 83, 85). Frons long, 1.4 times longer than wide at widest part, upper margin deeply angularly




**FIGURES 100–113.** *Pisacha balteiformis* **sp. nov.** 100. male genitalia, left view; 101. male anal tube, dorsal view; 102. aedeagus, dorsal view; 103. aedeagus, ventral view; 104. aedeagus, left view; 105. female anal tube, lateral view; 106. female anal tube, dorsal view; 107. gonoplac, posterior view; 108. gonoplac, ventral view; 109. female genitalia, ventral view; 110. gonoplac, left view; 111. gonapophysis IX and gonaspiculum bridge, right view; 112. gonapophysis IX and gonaspiculum bridge, dorsal view; 113. gonapophyse VIII and gonocoxa VIII, left view. Scale bars = 0.2 mm.




**FIGURES 114–118.** Aedeagus, lateral view. 114. *Pisacha kwangsiensis* Chou *et* Lu 1977; 115. *Pisacha yinggensis* **sp. nov.**; 116. *Pisacha baculiformis* **sp. nov.**; 117. *Pisacha falcata* **sp. nov.**; 118. *Pisacha balteiformis* **sp. nov.** Scale bars = 0.5 mm.

concave, median carina indistinct, disappeared near apical one-fourth (Fig. 86). Pronotum about 1.6 times longer than vertex in middle line, with narrow median carina; anterior margin obtusely convex, almost reaching the level of upper points of eyes, posterior margin archedly concave (Fig. 85). Mesonotum large, 2.7 times as long as vertex and pronotum combined in middle line, lateral carinae nearly reaching posterior margins. Tegmina transparent, clavus with 8–9 transverse veinlets between the suture and its longitudinal vein, two or three transverse veinlets between two claval veins. Spinal formula of hind leg 11–11–2.

*Male terminalia*. Anal tube with ventral margin sinuate; 2.4 times longer than widest part in dorsal view, apical margin arched (Figs 100, 101). Anal column very short (Fig. 101). Phallobase with dorso-basal portion expanding apically, apical margin arched, apico-ventral angles sharp (Fig. 102). Dorso-lateral phallobase lobes with apical portion curved upward dorsally and bifurcate, with about 12 small spikes near inner margin of each lobe, apical margin obtuse in lateral view (Figs 102, 104); lateral sides with a pair of relatively long bifurcate processes, upper branches curved near apex, as long as under branches. Ventral phallobase lobe round at median part, apical portion nearly rectangular, apical margin weakly arched (Figs 103,123). Phallus with a pair of short processes directed cephalad, but curved caudad near middle, tips of two processes point to caudad in ventral view (Figs 103, 104,118, 123). Pygofer with posterior margin distinctly convex at middle (Fig. 100).

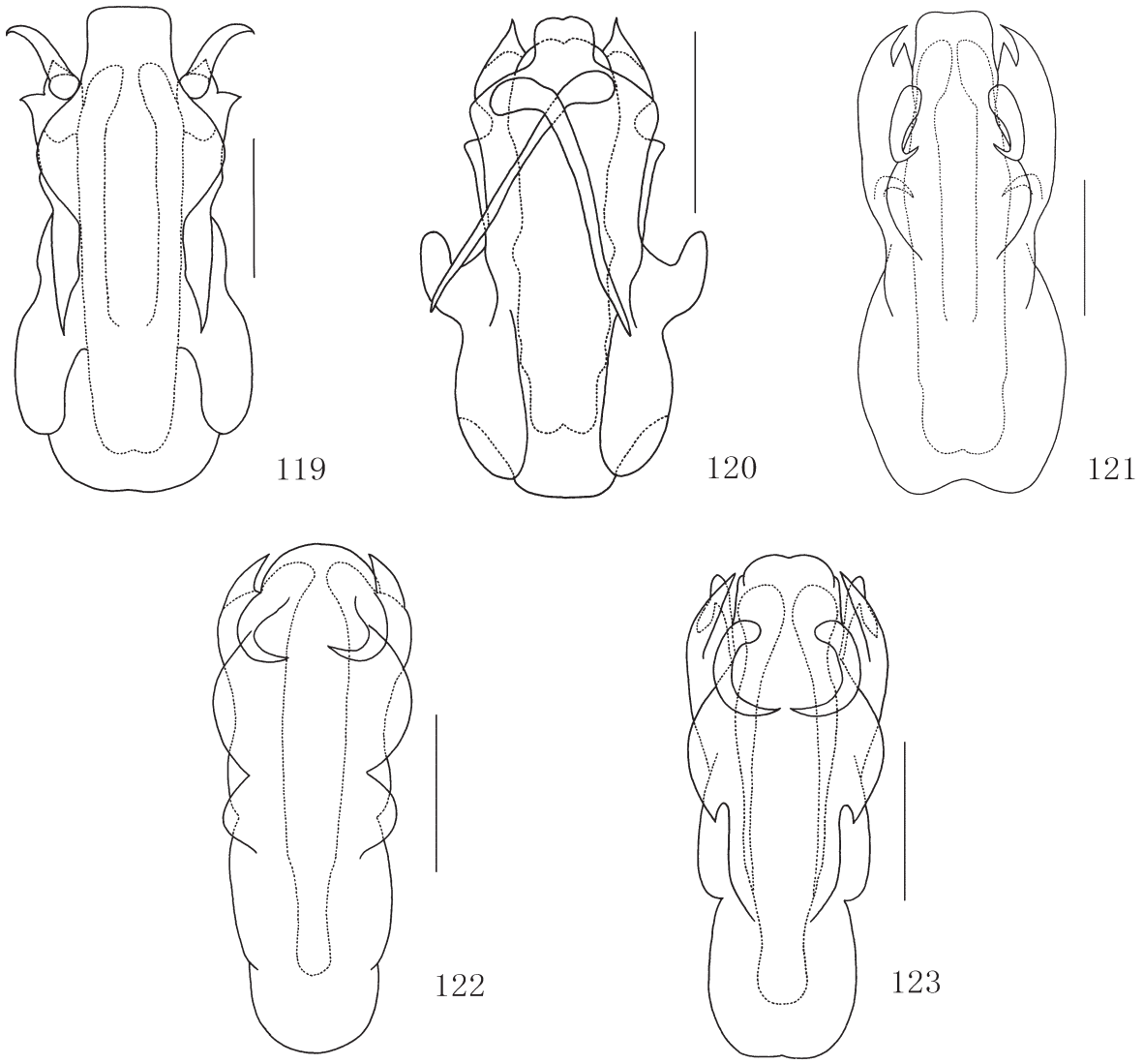
*Female terminalia*. Anal tube as long as wide at widest part, apical margin convex (Figs 105, 106). Gonoplac bearing about 9–10 rows of denticles in posterior view (Fig. 107). Anterior connective lamina of gonapophyses VIII with 10 teeth (Fig. 113). Sternum VII with posterior margin nearly straight (Fig. 109).

**Type material**. Holotype: male, Vietnam, **Ninh Binh**, Cuc Phuong National Park, N 20º 20' 586", E 105º 36' 024", 408m, 21 August 2008, Coll. Zheng G., Sac. PD., Li SQ.

Paratypes: 1 male, 3 females, same data as holotype.

**Diagnosis**. This species can be distinguished from all other species by the following features 1) the vertex with anterior margin almost straight; 2) tegmina with costal membrane 9 or 10 wide black transverse veinlets; 3) dorsolateral phallobase lobes with each dorsal bifurcate lobe bearing about 12 small spikes near inner margin; lateral apices with a pair of nearly equally bifurcate processes, the branches relatively long, upper branches curved near apex; 4) phallus with a pair of short hooks, tips point to caudad in ventral view.

**Etymology.** The specific epithet derived from the Latin "balteiformis", referring to costal membrane of tegmina with transverse veinlets widened into bands.




**FIGURES 119–123**. Aedeagus, ventral view. 119. *Pisacha kwangsiensis* Chou *et* Lu 1977; 120. *Pisacha yinggensis* **sp. nov.**; 121. *Pisacha baculiformis* **sp. nov.**; 122. *Pisacha falcata* **sp. nov.**; 123. *Pisacha balteiformis* **sp. nov.** Scale bars = 0.5 mm.

## Discussion

For the moment, the genitalic characters seem to be more useful than external morphological features for the identification of relationships between Nogodinidae, Issidae, Tropiduchidae, and Acanaloniidae (Gnezdilov, 2009). Fennah (1978) considered the female genitalia can be used for identification of the highlevel taxa of Nogodinidae, and the differences of the conformation of the third valvulae of the ovipositor among different groups are most clearly evidented. In this study, the new genus *Goniopsarites*, **gen. nov.** is considered to be included in the tribe Pisachini mostly according to the genitalic characters: gonoplacs with posterior surface flattened and bearing a broad tract of minute denticles which only exist in the tribe Pisachini; genital style expanding distally, subtriangular

in lateral view which similar to *Pisacha*, and in other tribes of the subfamilies Nogodininae, genital style more or less narrowing distally, nearly rectangular in lateral view (Fennah, 1969, p.94: fig. 511; 1978, p.116: fig. 16; Wu and Yang, 1989, p.164: fig. 1E; Chan & Yang, 1994, p.76,78: fig. 31F, 32F; Gnezdilov, 2007b, p. 59: fig. 14).

In the present paper, seven species of *Pisacha* are mentioned. These speices are externally similar to each other which easily make mistakes in the identification process. *P. naga* had been recorded in Hainan Province from China according to one female specimen by Fennah (1956). We found it is error identification and the female specimen should be *P. yinggensis* **sp. nov.**. Meanwhile, the distributional record of *P. naga* is removed from China. These speices of *Pisacha* differ from each other principally by the following characteristics: aspect ratio of frons, the colour and length of carinae on frons; anterior margin of vertex convex or concave or straight medially, tegmina with or without marking; the length of lateral carinae on mesonotum and the genitalic characters. In addition, we found these species distributed in different regions, geographical distribution could be considered as an important factor in species identification of this group.

Even the higher classification of the Nogodinidae had been proposed as we remarked in the introduction. However, as always, the family of Nogodinidae is poorly defined, and the phylogenetic analyses of the Nogodinidae also are unclear up to now. The molecular phylogenetics on the planthoppers has been indicated that Nogodinidae are polyphyletic (Urban and Cryan, 2007; Song and Liang, 2013). More studies are needed to better understand phylogenetic analyses of the Nogodinidae.

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