



## The genus *Jembra* Metcalf and Horton from Taiwan with descriptions of two new species and the nymph of *J. taiwana* sp. nov. (Hemiptera: Cercopoidea: Aphrophoridae)

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### Abstract

The genus *Jembra* Metcalf and Horton comprises five species from Taiwan and China. In this paper, the fauna of the genus from Taiwan is reviewed and includes three species. Two new species, *J. kuanae* sp. nov. and *J. taiwana* sp. nov., are described, and *J. inouyei* Matsumura is redescribed. The fourth and fifth instar nymph of *J. taiwana* sp. nov. is described for the first time. A dichotomous key for the identification of the five species of *Jembra* is also presented.

**Key words:** spittlebug, taxonomy, morphology, nymph

### Introduction

Shih & Yang (2002a) reported that the spittlebug family Aphrophoridae comprises at least 17 genera and 73 species from Taiwan. They then began studying the taxonomy, ecology, and biology for the aphrophorids of Taiwan and its adjacent islands (Shih & Yang, 2002b; 2005, 2007; Shih et al., 2005). These studies show that most species are widely distributed over the mountain areas of Taiwan, and their host plant associations are not clear except for a few species of *Poophilus*, *Clovia*, *Ariptyelus*, and *Aphrophora*.

The genus *Jembra* is one of the genera from mountain areas in Taiwan, but its biology remains poorly known. It was described by Metcalf and Horton in 1934 based on the pronotal carinae and male genitalia of the type species *J. pallida*. Kwon & Lee (1979) suggested that *Jembra* was a junior synonym of *Awafukia* Matsumura based on their studies of the male genitalia of *Awafukia nawae* (Matsumura) and Metcalf & Horton's (1934) original description. Liang (1999) reviewed *Jembra*, considered it valid and removed it from synonymy under *Awafukia* Matsumura. Then he treated *J. pallida* as the junior synonym of *J. nigronevosa* (Lallemand), moved *Jembroides inouyei* Matsumura to *Jembra*, added one new species, *J. sinica* from southwest China, and provided a generic redefinition and a key to the species of *Jembra*. Liang (2001: 443) treated *J. nigronevosa* (Lallemand) as the junior synonym of *J. brevistriga* (Walker, 1858). Therefore, since 2001 the genus *Jembra* has included 3 valid species, including *J. brevistriga*, *J. sinica*, and *J. inouyei*, of which the former two species are from China and the latter is from Taiwan.

While studying the aphrophorid fauna of Taiwan, three *Jembra* (sensu Liang 1999) species, *J. inouyei*, *J. kuanae* sp. nov., and *J. taiwana* sp. nov., were found. In this paper, the genus is defined based on the structure of the male genitalia, coxal meracanthus of midleg, and the ultrastructure of antennal flagellar sensory organs.

A key to known *Jembra* species based on the adults is also provided.

In addition, although the morphology of adult froghoppers has been relatively well studied, work on morphological characteristics of their nymphs remains very scarce. This is especially true for the tribe Aphrophorini which has similar nymphs that are difficult to identify. In this study, the nymphal morphology of *Jembra* is described based on specimens of *J. taiwana* **sp. nov.** It is our hope that the information on nymphal morphology will help us to understand the phylogenetic relationships among aphrophorid taxa.

## Materials and methods

The examined materials were from Taiwan Agricultural Research Institute (TARI), Insect and Mite Collection, Wufeng, Taichung, Taiwan, ROC.

The terminology for external morphology and male genitalia follow those of Shih & Yang (2007). The ultrastructure of the antennal sensory organs was studied using a scanning electron microscope (Hitachi S-570) at an accelerating voltage of 5 kV. Specimens for SEM were prepared following the procedure of Shih & Yang (1996).

## Systematic account

### Genus *Jembra* Metcalf & Horton, 1934

*Jembra* Metcalf & Horton, 1934, Lingnan Sci. J. 13: 408.

*Jembroides* Matsumura, 1942a, Ins. Matsumurana 16: 55 (Type species: *Jembroides inouyei* Matsumura, 1942) [synonymized by Liang, 1999: 339].

Type species: *Cercopis nigronervosa* Lallemand, 1924

**Diagnosis.** Adults. The following combinations of characteristics of the genus *Jembra* are modified from Liang (1999: 339), and apparently separate *Jembra* from other genera in the tribe Aphrophorini: (1) pronotum with a median longitudinal carina and two pairs of indistinctly intermediate longitudinal carinae; (2) middle coxa with meracanthus (Figs. 1A, 2F, 3G, 5K) on ventrolateral side, fin-shaped, lamellate, tapering to apex, with distinct or indistinct carina(e) on the middle and/or inner margin of dorsal side; (3) ventral processes of pygofer (= subgenital plates = genital plates) narrow, well separated from pygofer (Figs. 1C, 3J), bilobed, excavated centrally, widely separated distally, apex acute and directed mesad; (4) genital styles (= parameres) nearly Y-shaped (Figs. 1D–E, 5O–P) or triangular (Figs. 3K–L); (5) aedeagus with shaft very short, apical portion very broad, lamellate and flat, strongly extended laterodorsally (Figs. 1G–J, 3N–P).

Nymphs. In this paper the external nymphal morphology of *Jembra* is examined and presented for the first time, based on the fourth and fifth instar nymphs of *J. taiwana* **sp. nov.** as follows: (1) body length 11.54–12.43 mm, width (includes wing pads) 4.76–5.73 mm; (2) head in ventral view rhombus shaped (Figs. 5B, 5D); vertex near rectangular (Figs. 5A, 5C), anterior margin without distinct boundary with dorsal frons; frons dorsal view (Figs. 5A, 5C) distinctly protrusive, ventral view (Figs. 5B, 5D) flat longitudinally and with indistinctly transverse carinae at each side; ocelli distinctly nearer each other than to the eyes; antenna 9-segmented and flagellate, without antennal socket in base; rostrum rather long, extended to at least the end of the hind coxae; (3) pronotum nearly hexagonal, with distinct median carina; mesonotum developed; metanotum rather narrow in middle part; anterior and posterior wing pads triangular (Fig. 5E), each pad extended to lateral midlength of abdominal tergite II (fourth instar nymph) or tergite III (fifth instar nymph); coxal meracanthus of midleg undeveloped (Fig. 5F); each tibia of legs with apical spines arranged in 2 rows (Figs. 5G–H), hind tibia without lateral spines (Fig. 5G); (4) abdomen 9-segmented, abdominal tergite I very short; genital organ visible in fourth and fifth instar nymphs.

**Distribution:** China, Taiwan.

**Remarks:** *Jembra* is similar to *Jembrana* Distant, 1908. The differences between them are shown in Table 1. The morphological definition of the genus *Jembrana* follows those of Distant (1908) and Metcalf & Horton (1934).

**TABLE 1.** The diagnostic characteristics of *Jembra* and *Jembrana*.

Characteristics	Genus <i>Jembra</i>	Genus <i>Jembrana</i>
Antennal ledge	thin	inner margin thick
Pronotum	with median longitudinal carina and two pairs of indistinct intermediate longitudinal carinae	with median longitudinal and pair of diverging intermediate carinae
Hind tibia	with two spines	with one/ or two spine(s)
Ventral process of pygofer	separated well from pygofer	fused with pygofer
Genital style	nearly Y-shaped or triangular, slightly curved inward at middle of apex	Y-shaped, strongly curved inward at middle of apex
Aedeagus	short, apical portion very broad, strongly extended laterodorsally	elongate, apical portion relatively narrow, dorsal apex extended

### Key to the species of *Jembra* Metcalf & Horton

1. Ventral process of pygofer apex narrowly truncate, outer margin distinctly angled in ventral view ..... 2
  - Ventral process of pygofer tapered from base to apex, apex acute, outer margin not angled in ventral view ..... 3
2. Pronotum with an anterior, central, nearly X-shaped dark marking; aedeagus with the base triangular, apex with pair of finger-like and obviously elevated processes (Figs. 1G, 1H) ..... *inouyei* (Matsumura)
  - Pronotum without X-shaped markings as above; aedeagus with base triangular, apex with pair of finger-like and obviously declivous processes (Metcalf & Horton, 1934: Plate 143: Figs. 136, 140).....*brevistriga* (Walker)
3. Smaller species, body length less than 9.0 mm; ventral process of pygofer with apex acute, not forked ..... 4
  - Relatively large species, body length greater than 11.0 mm; ventral process of pygofer with apex forked (Fig. 5J) ...  
..... *taiwana* **sp. nov.**
4. Rostrum nearly extended to apex of middle trochanters; pronotum without obviously lateral carinae, median carina interrupted by some longitudinal wrinkles on the anterior margin (Fig. 3A); genital styles nearly triangular (Figs. 3K–L) .....*kuanae* **sp. nov.**
  - Rostrum reaching beyond hind trochanters; pronotum with a distinct median longitudinal carina; genital styles nearly Y-shaped, with distinct inner and outer processes (Liang, 1999: Fig. 6) ..... *sinica* Liang

### *Jembra inouyei* (Matsumura, 1942)

(Fig. 1)

*Jembroides inouyei* Matsumura, 1942, Ins. Matsumurana 16: 56.

*Jembra inouyei* (Matsumura, 1942) [transferred by Liang, 1999: 345].

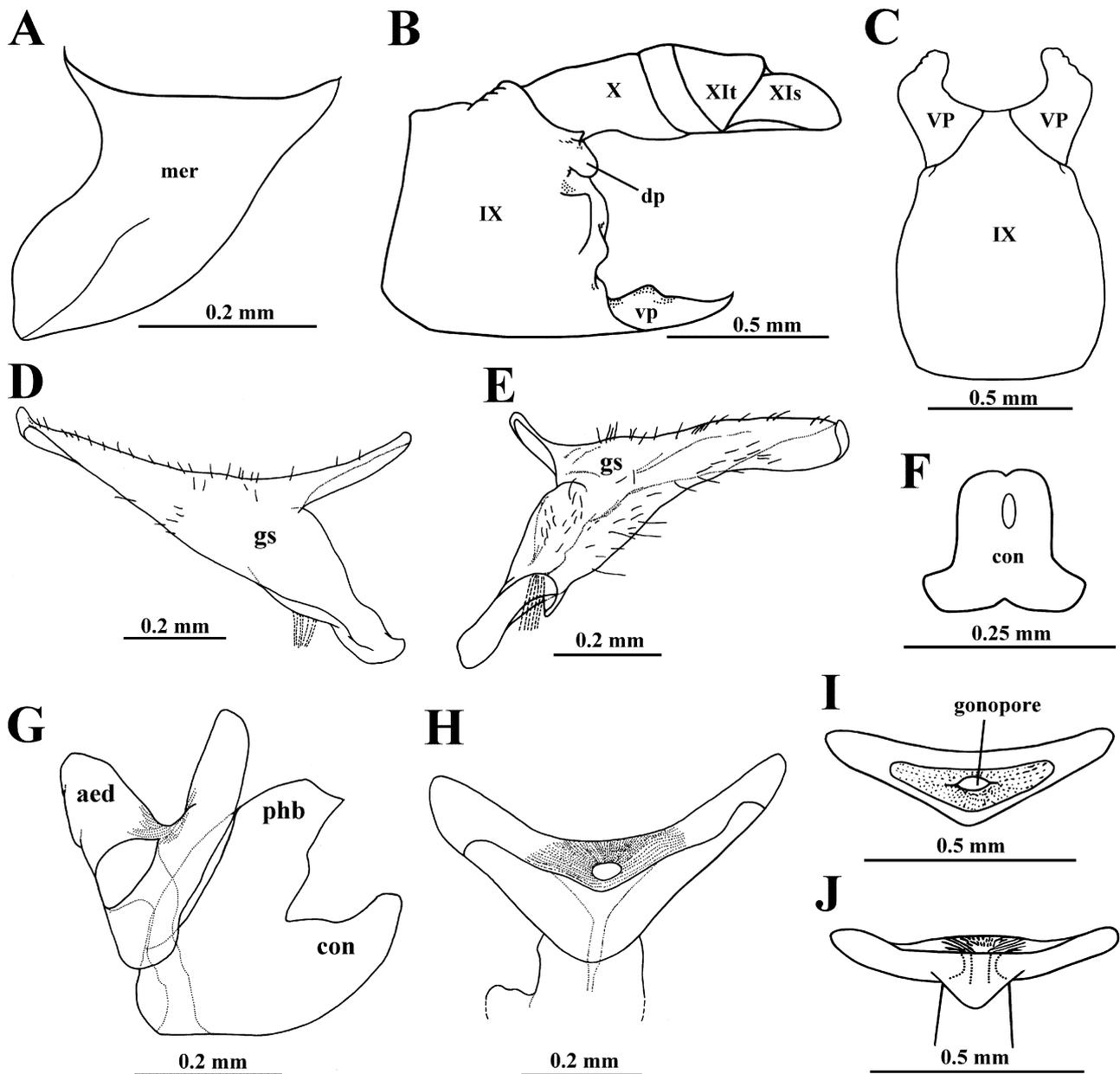
Type deposition: EIHU (Komatsu and Hayashi, 1998).

Type locality: TAIWAN: Arisan [Alishan], Chiayi Co. (Matsumura, 1942).

**Coloration:** General color brown, pronotum, mesoscutellum and tegmina marked with dark brown. Pronotum with anterior, central, nearly X-shaped dark marking. Tegmen brown with light brown patches on costal and apical areas, veins marked with blackish-fuscous and testaceous.

**Structure:** Head width: body width: body length= 1: 1.3: 3.1. Head in ventral view rhombus shaped, as long as wide; in dorsal view triangular, about 3.1 times as wide as long. Head subequal to pronotum in width at level of anterior margin, about 1.05: 1.0. Frons with 16 transverse ridges at each side in ventral view. Expanded flagellar base with 3 plate-shaped basiconic sensillae on ventrolateral side. Rostrum reaching

beyond hind femora. Pronotum width at widest part greater than median length by about 1.4: 1.0. Tegmen about 2.5 times as long as wide, AM (length of anal margin): PM (length of posterior margin): LT (length of tegmen) = 1.0: 2.5: 3.2. Wing with 4 apical cells. Hind tibia with two lateral spines, distal one about 2.3 times as long as basal one; apical spines arranged into 2 rows, upper row composed of 8 spines, lower one composed of 7 spines.



**FIGURE 1.** *Jembra inouyei* (Matsumura, 1942): A, meracanthus of right midleg, dorsal view; B, abdominal segments IX–XI, lateral view; C, abdominal segment IX, ventral view; D, right genital style, outer side; E, the same, inner side; F, connective, ventral view; G, aedeagus, dorsolateral view; H–J, apex of aedeagus. H, caudoventral view; I, caudal view; J, dorsal view; aed, aedeagus; con, connective; dp, dorsal process of pygofer; gs, genital styles; IX–XI, abdominal segments IX–XI; mer, meracanthus; phb, phallobase; vp, ventral process of pygofer; XIIt, abdominal tergite XI; XIIs, abdominal sternite XI.

**Male Genitalia:** Pygofer in lateral view subquadrate (Fig. 1B), with irregular processes along apical margin; pygofer ventral view pentagon like (Fig. 1C); dorsal process of pygofer lateral view narrowly semicircle-shaped and directed ventrally; ventral process of pygofer lateral view subquadrate, suddenly acute

at apex and directed dorsally, shorter than ventral margin of pygofer in length, about 0.5 times; ventral processes of pygofer ventral view bilobed, each lobe acute at tip and direct mesade (Fig. 1C). Abdominal segment X cylindrical, longer than tergite of segment XI (XI<sub>t</sub>) in length by about 1.9 times (Fig. 1B). Aedeagus short, strongly curved inward in the middle of apex; in dorsolateral view V-shaped (Fig. 1G); in caudoventral or caudal view triangular (Figs. 1H–I); in dorsal view T-shaped (Fig. 1J). Connective in ventral view trapezoidal (Fig. 1F). Genital styles slender and elongate, nearly Y-shaped (Figs. 1D–E).

**Measurements:** Body length (from apex of vertex to tip of tegmen): ♂, 9.38 mm; Body width: ♂, 3.51 mm.

**Specimen examined:** 1 Male, TAIWAN, Lienhuachi, Nantou, 650m, 23–26. V. 1980, K. S. Lin & B. H. Chen (TARI).

**Distribution:** Taiwan.

**Host plants:** Unknown.

**Remarks:** According to our collecting results and historical studies (Matsumura, 1942; Liang, 1999), this species is not only endemic to Taiwan, but is also rather rare. The present study was the first to dissect and illustrate the male genitalia of this species. Liang (1999) noted that this species is similar to *J. nigronevosa* (Lallemand) [the synonym of *J. brevistriga* (Walker)] in general coloration and external appearance. Comparison of this species with *J. nigronevosa* (Lallemand) from Liang (1999: 345) and Metcalf and Horton (1934: Plate 43–136 and Plate 43–140) based on external morphology and male genitalia individually indicates that the species can be distinguished from *J. brevistriga* (Walker) by its pronotum with X-shaped dark marking; scutellum with basal lateral margins whitish testaceous; costal and apical areas of tegmina with whitish testaceous patches; aedeagus in dorsal view T-shaped, apical portion winged, and each lateral tip of winged portion directed upward.

### *Jembra kuanae* Shih sp. nov.

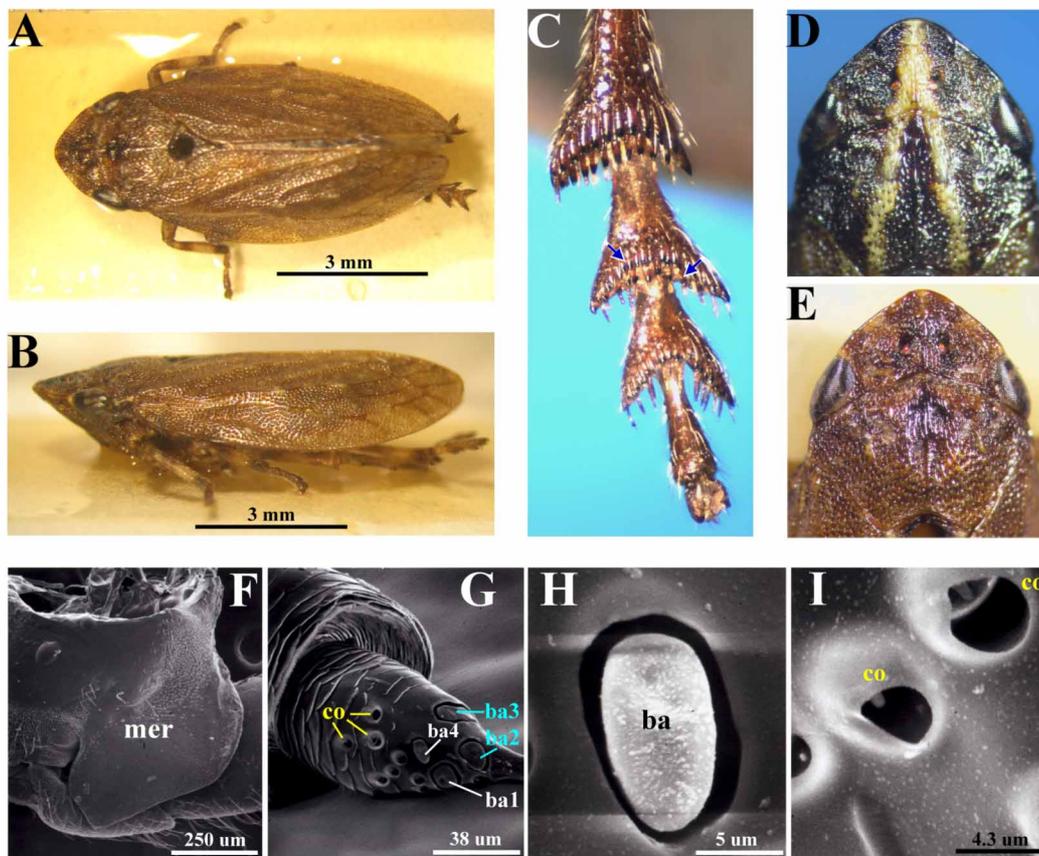
(Figs. 2, 3)

**Coloration:** General color brown (Fig. 2A). Tegmen without markings (Fig. 2B); wing hyaline, veins brown, apical area with brown pubescence except apical cells. Two color variations on head (Figs. 2D, 2E), pronotum and mesoscutellum: dark brown type with irregular dark brown mottles (Fig. 2E), and yellowish brown type with one obviously inverted and yellowish V-shaped stripe (Fig. 2D).

**Structure:** Head width: body width: body length = 1:1.6:3.2. Head in ventral view rhombus shaped (Fig. 3B), as long as wide; head in dorsal view triangular (Fig. 3A), about 2.6 times as wide as long. Head subequal to pronotum at level of anterior margin, about 1.04:1.0. Frons with a median longitudinal carina and 10 transverse ridges in ventral view (Fig. 3B). Expanded flagellar base with 4 plate-shaped basiconic sensillae on ventrolateral side. Rostrum nearly extended to apex of middle trochanters. Pronotum width at widest part greater than median length by about 1.5: 1.0. Tegmen densely punctured (Fig. 3D) with pits about 0.1 mm in diameter; 3 times as long as wide, AM (length of anal margin): PM (length of posterior margin): LT (length of tegmen) = 1.0: 3.0: 3.9. Wing with 3 apical cells (Fig. 3E). Hind tibia with two lateral spines, distal one about 2.0–2.5 times as long as basal one; apical spines arranged into 2 rows, upper row composed of 11 spines, lower one composed of 12 spines. First hind tarsomere with apical spines arranged in two rows (Figs. 2C, 3H), upper row composed of 18–21 spines, lower one composed of 7–12 spines.

**Male Genitalia:** Pygofer in lateral view subquadrate (Fig. 3I), about 1.3 times wider than long; basal margin of pygofer straight downward, then protruding at ventral third; pygofer ventral view oval (Fig. 3J); dorsal process of pygofer (dp) in lateral view cone like, ventrally directed (Fig. 3I); ventral process of pygofer (vp) (= genital plate) in lateral view, about 0.7 times longer than posterior margin of pygofer; ventral processes of pygofer in ventral view bilobed, acute at tip and direct mesade (Fig. 3J). Abdominal segment X cylindrical, subequal to the abdominal tergite of segment XI (XI<sub>t</sub>) in length. Aedeagus T-shaped (Figs. 3O–P) in both dorsal and ventral views, joined with basal part and apical winged plate; basal part of aedeagus short in

lateral view, cylindrical, and membranous; apical winged plate somewhat hardened; transversely enlarged at caudal view, widest at middle and with a obviously concave gonopore (Fig. 3N). Genital style triangular, basal part narrow and gradually widening to apex (Figs. 3K–L).



**FIGURE 2.** *Jembra kuanae* Shih, **sp. nov.**: A, Paratype, male, dorsal view; B–C, the same. B, lateral view; C, the first tarsus with apical spines arranged in 2 rows (shown as 2 arrowheads); D–E, head and pronotum, male, one of paratypes; F, middle coxa with one meracanthus (mer) from ventrolateral side; G, flagellum with 2 types of sensory organs on ventrolateral side; H, basiconic sensilla (ba); I, coeloconic sensilla (co).

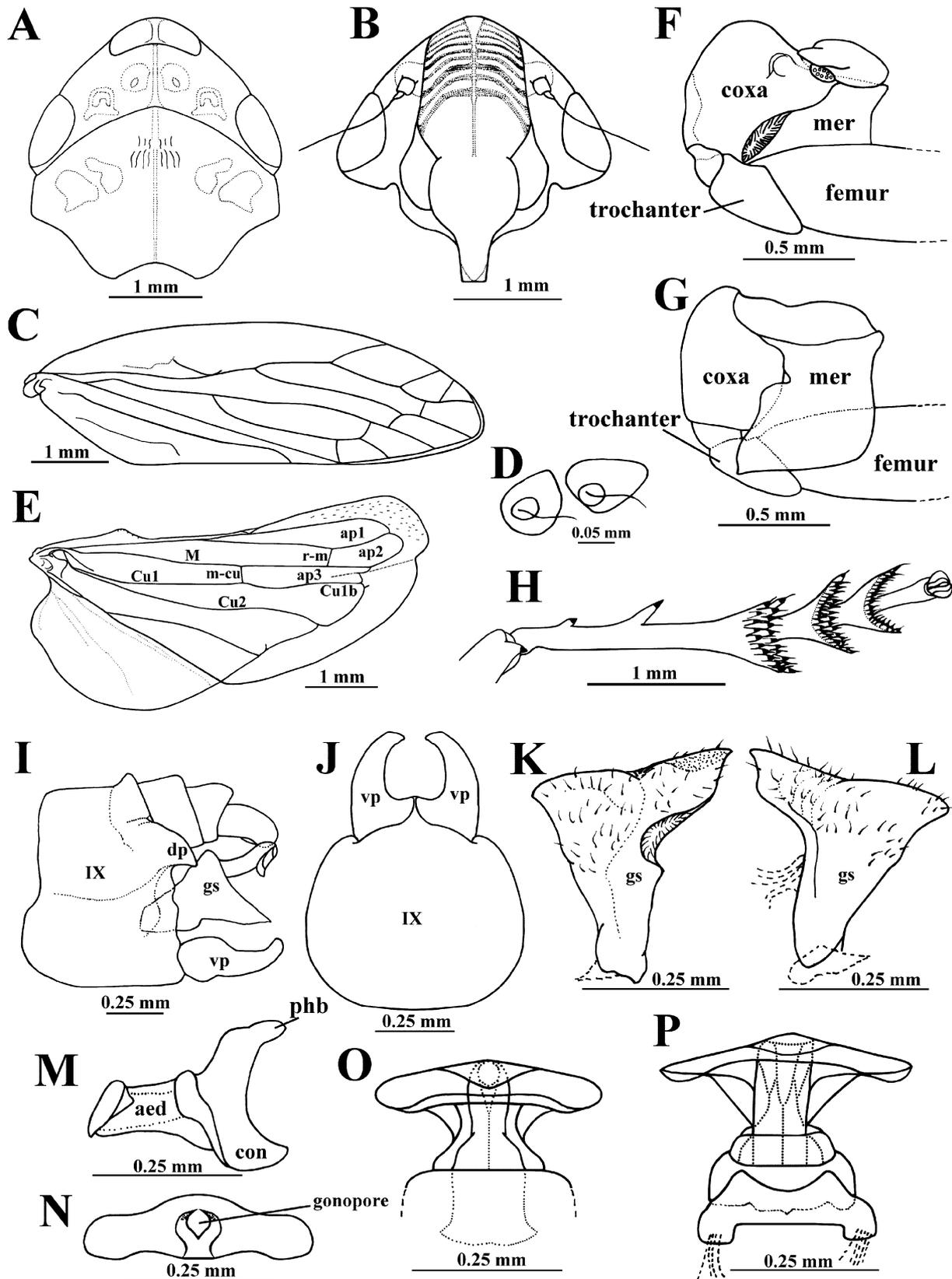
**Measurements:** Body length (from apex of vertex to tip of tegmen): ♂,  $7.9 \pm 0.2$  mm (n = 17); ♀,  $8.5 \pm 0.1$  mm (n = 2); Body width: ♂,  $3.8 \pm 0.3$  mm (n = 17); ♀,  $3.9 \pm 0.3$  mm (n = 2).

**Holotype:** Male, TAIWAN, Taichung, Wanfeng Hill, XII. 1984, K. S. Lin & K. C. Chou, Malaise trap; Holotype depository: TARI.

**Paratypes:** TAIWAN, 1 male, Taichung, Wanfeng Hill, II. 1984, K. S. Lin & K. C. Chou, Malaise trap (TARI); 5 males, 1 female, Taichung, Wanfeng Hill, III. 1984, K. S. Lin & K. C. Chou, Malaise trap (TARI); 2 males, Taichung, Wanfeng Hill, V. 1984, K. S. Lin & K. C. Chou, Malaise trap (TARI); 1 male, Taichung, Wanfeng Hill, VII. 1984, K. S. Lin & K. C. Chou, Malaise trap (TARI); 3 males, 1 female, Taichung, Wanfeng Hill, VIII. 1984, K. S. Lin & K. C. Chou, Malaise trap (TARI); 1 male, Taichung, Wanfeng Hill, XII. 1984, K. S. Lin & K. C. Chou, Malaise trap; 1 male, Nantou, Chushan, 24-IX-1999, H. T. Shih (TARI); 1 male, Nantou, Chushan, 24-IX-1999, H. T. Shih (Institute of Zoology, Chinese Academy of Sciences, China); 1 male, Nantou, Chushan, 24-IX-1999, H. T. Shih (Canadian National Collection of Insects, Ottawa, Canada); 1 male, Nantou, Chushan, 24-IX-1999, H. T. Shih (National Museum of Natural Science, Taiwan, ROC.).

**Etymology:** Named for the first author's mother K. C. Kuan.

**Distribution:** Taiwan.



**FIGURE 3.** *Jembra kuanae* Shih, **sp. nov.**: A, Holotype, male: A, head and pronotum, dorsal view; B, head, ventral view; C, tegmen; D, punctures of tegmen; E, Wing; F, right midleg, dorsal view; G, the same, ventral view; H, tibia and tarsi of left hindleg; I, abdominal segments IX–XI, lateral view; J, abdominal segment IX, ventral view; K, right genital style, inner side; L, the same, outer side; M, aedeagus, lateral view; N, apex of aedeagus, caudal view; O, aedeagus, dorsal view; P, aedeagus, ventral view; ap, apical cell.

**Host plants:** Unknown.

**Remarks:** This species can be distinguished easily from other *Jembra* species by the following characteristics: (1) antenna with 4 plate-shaped basiconic sensillae (Figs. 2G–H) on the expanded flagellar base; (2) pronotum without obvious lateral carinae, median carina interrupted by some longitudinal wrinkles on the anterior margin (Fig. 3A); (3) frons with median longitudinal carina (Fig. 3B); (4) wing with 3 apical cells and without pubescence in apical cells (Fig. 3E); (5) the first tarsus with apical spines arranged in 2 rows (Figs. 2C, 3H); (6) the dorsal process of pygofer conical (Fig. 3I); (7) genital style triangular (Figs. 3K–L), without distinct slender inner and outer processes; (8) apical portion of aedeagus winged, and each lateral tip of winged portion directed ventrad (Figs. 3O–P).

***Jembra taiwana* Shih sp. nov.**

(Figs. 4, 5)

**Coloration:** General color brown. Pronotum with transverse blackish band posteriorly (Fig. 4C). Tegmen (Fig. 4D) dark brown with large and irregular blackish patches, two light brown patches on costal area, veins marked with blackish-fuscous and testaceous.

**Structure:** Head width: body width: body length= 1.0: 1.5: 3.3. Head ventral view rhombus shaped, about 1.1 times as wide as long; head dorsal view triangular, about 4.4 times as wide as long. Head subequal to pronotum at level of anterior margin, about 1.1:1.0. Frons with 13 transverse ridges at each side of ventral view. Expanded flagellar base with 3 plate-shaped basiconic sensillae on ventrolateral side. Rostrum extended to the end of hind femora. Pronotum width at widest part than median length about 1.5: 1.0. Tegmen about 2.6 times as long as wide, AM (length of anal margin): PM (length of posterior margin): LT (length of tegmen) = 1.0: 1.9: 2.8. Wing with 4 apical cells (Fig. 4E). Hind tibia with two lateral spines, distal one about 1.7 times as long as basal one; apical spines arranged into 2 rows, upper row composed of 8 spines, lower one composed of 8 spines.

**Male Genitalia:** Pygofer lateral view subquadrate, about 1.3 times wider than long; basal margin of pygofer straight downward and protruding basally at ventral fourth, then curved ventrally (Fig. 5I); pygofer ventral view pentagon like (Fig. 5J); dorsal process of pygofer lateral view small and semicircular (Fig. 5I); ventral process of pygofer lateral view subquadrate, apex forked (Fig. 5I); ventral processes of pygofer ventral view bilobed, each lobe with two teeth at tip and directed mesad (Fig. 5J). Abdominal segment X cylindrical, longer than abdominal tergite of segment XI (XIIt) in length, about 1.9 times. Aedeagus short, apex obviously curved inward in the middle (Fig. 5M); in caudal view triangular (Fig. 5N) and in dorsal view T-shaped. Connective in ventral view triangular (Fig. 5L). Genital styles slender and elongate, nearly Y-shaped (Figs. 5O–P).

**Measurements:** Body length (from apex of vertex to tip of tegmen): ♂, 11.26 mm; Body width: ♂, 5.01 mm.

**HOLOTYPE:** Male, TAIWAN, Licha Forest Rd., Taitung, VII. 2003, C. H. Chang; Holotype depository: TARI.

**Etymology:** Named for its occurrence in Taiwan.

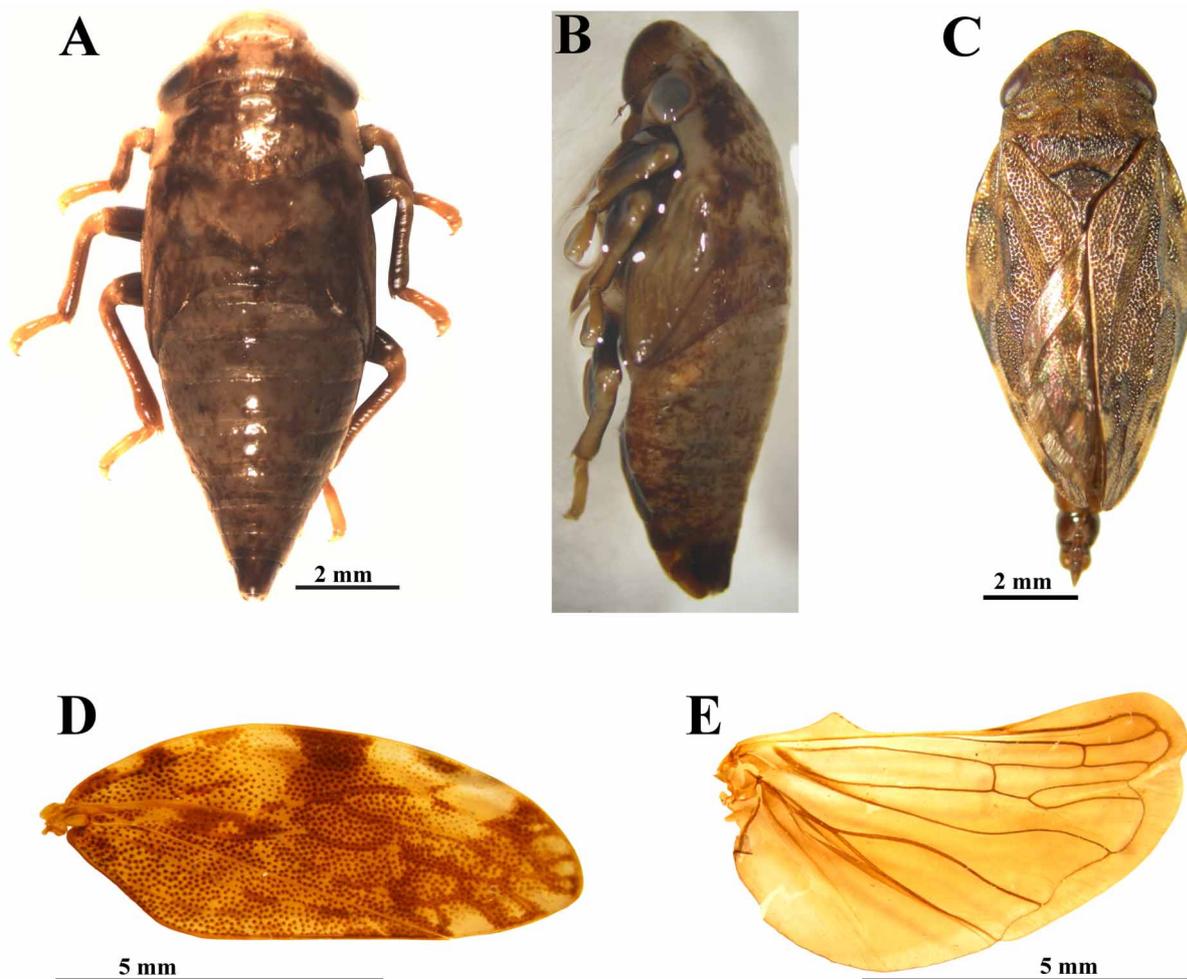
**Distribution:** Taiwan.

**Host plants:** *Lagerstroemia subcostata* Koehne (Lythraceae).

**Remarks:** This species can be distinguished easily from *J. inouyei* (Matsumura) by its pronotum with a transverse blackish band at the posterior margin; ventral process of pygofer in ventral view bilobed, with each lobe bearing two teeth at tip and directed mesad (Fig. 5J). In this study, we also observed the external morphology for the fourth and fifth instar nymphs of the species *J. taiwana* sp. nov. as follows.

**Description of nymphs.** The following combinations of characteristics are distinctive for fourth and fifth instar nymphs of *Jembra*.

Fourth instar nymph (Figs. 5A–B).

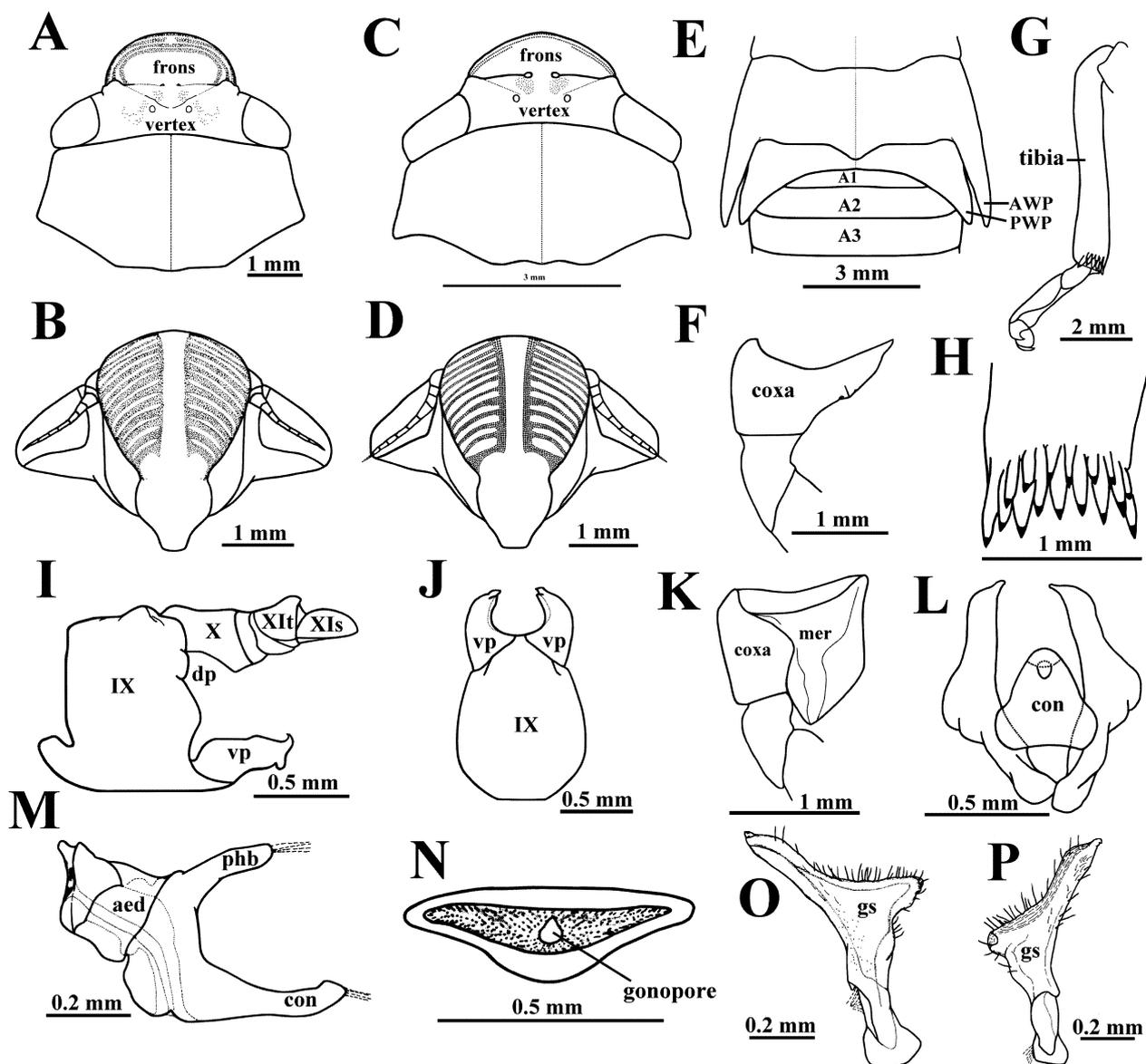


**FIGURE 4.** *Jembra taiwana* Shih, **sp. nov.**: A–B, the fifth instar nymph. A, dorsal view; B, lateral view. C–E, adult, Holotype, male: C, dorsal view; D, tegmen; E, wing.

**Coloration:** Body in dorsal view generally grayish white with irregular brownish or blackish brown markings, bands, and patches; ventral view blackish brown. Frons in ventral view blackish brown with yellowish brown carinae, and dorsal view brown marginally. Vertex with longitudinally brownish band between eye and ocellus. Eyes grayish white and ocelli pale red. Antennal ledges white, antennae brown. Gena and lorum white with brown patches. Rostrum yellowish brown. Pronotum nearly all brown except lateral margins. Legs yellowish brown in coxae and trochanters, and blackish brown in femora. Visible segment IX of abdomen blackish brown.

**Structure:** Body length 11.54 mm, width (includes wing pads) 4.76 mm. Head width: body width: body length= 1.0: 1.3: 2.7. Head in ventral view rhombus shaped, about 1.4 times as wide as long. Vertex nearly rectangular, about 4.8 times as wide as long. Frons distinctly protrudent, ventral view flat longitudinally and with 13 indistinct transverse carinae at each side; without distinct boundary between dorsal frons and vertex. Each ocellus with fine punctures from anterior to lateral margins. Ocelli very close to each other, about 1.7 times as distant from eyes as from each other. Lorum curved inward from base to middle. Antenna without socket at base, 9 segments and flagellate. Rostrum long, extended to the end of hind coxae. Pronotum near hexagonal, with a distinctly median carina, width at widest part than median length about 1.9: 1.0. Wing pads triangular, each pad extended to the lateral middle of the abdominal tergite II. Coxal meracanthus of midleg undeveloped. Each tibia with apical spines arranged in 2 rows. Hind tibia without lateral spines. Abdomen 9-segmented. Abdominal tergite I very short. Genital organ visible.

Fifth instar nymph (Figs. 4A–B, 5C–H)



**FIGURE 5.** *Jembra taiwana* Shih, **sp. nov.**: A–B, the fourth instar nymph. A, head and pronotum, dorsal view; B, head, ventral view; C–H, the fifth instar nymph. C, head and pronotum, dorsal view; D, head, ventral view; E, anterior and posterior wing pads; F, coxal meracanthus of midleg; G, tibia and tarsus, hindleg; H, apical spines of tibia, hindleg; I–P, Holotype, adult, male: I, abdominal segments IX–XI, lateral view; J, abdominal segment IX, ventral view; K, coxal meracanthus of midleg; L, connective and genital styles, ventral view; M, aedeagus, lateral view; N, apex of aedeagus, caudal view; O, right genital style, outer side; P, the same, inner side; A1–A3, abdominal segmented 1–3; AWP, anterior wing pad; PWP, posterior wing pad.

The coloration (Figs. 4A–B) and structure of the fifth instar nymph is very similar to the fourth instar nymph, but this instar may be distinguished by the following combinations of characteristics: (1) Body length 11.70–12.43 mm, width (includes wing pads) 4.88–5.37 mm.; (2) Rostrum extended to the middle or end of hind trochanters; (3) Each lateral margin of pronotum with obvious angle at posterior margin (Fig. 5C); (4) Each wing pad extended to the lateral 1/3–1/2 of the abdominal tergite III (Fig. 5E).

**Specimens examined:** TAIWAN, 1 female (fourth instar nymph), 1 female and 1 male (fifth instar nymph), Licha Forest Rd., Taitung, VII. 2003, C. H. Chang (TARI).

**Host plants:** Same as holotype.

**Bionomics:** Based on field observations in Taiwan by the first author, this species is not common. Nymphs have rather long and visible rostrums, and construct their frothy masses on the trunk or branches of host plants. In general, each frothy mass only covers one nymph. The mass size is over 30 mm in length for fifth instar nymphs; and the viscosity of their frothy mass is stronger than in other aphrophorid nymphs (e.g. *Poophilus costalis*, *Mesoptyelus arisana*, *Aphrophora taiwana*, and others), but it is obviously weaker than that of cercopid nymphs (e.g. *Cosmoscarta* and *Eoscarta*).

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