



New taxa and new records of Deltocephalini leafhoppers from Thailand (Hemiptera: Cicadellidae: Deltocephalinae)

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Abstract

Two new genera and three new species of the leafhopper tribe Deltocephalini are described from Thailand, viz., *Loeia* Duan **gen. n.** with *L. tamtipi* Duan **sp. n.** as type species, *Phetchabunia* Duan **gen. n.** with *P. janteabi* Duan **sp. n.** as type species, and *Maiestas subsirii* Duan **sp. n.**. Five new country records for Thailand are also given, viz. *Deltocephalus vulgaris* Dash & Viraktamath, *Maiestas dinghuensis* Zhang & Duan, *Maiestas scripta* (Distant), *Paramesodes* **sp.**, and *Polyamia acicularis* Dai, Xing & Li.

Key words: Auchenorrhyncha, morphology, taxonomy, new species

Introduction

The grass-feeding leafhopper tribe Deltocephalini is distributed worldwide and includes those genera that have a linear rather than Y-shaped connective, fused to the aedeagus (Webb & Viraktamath, 2009). During the course of revisionary work on Deltocephalini, we discovered two new monotypic genera and a new species of *Maiestas* Distant from Thailand which we describe below, and five new country records (see checklist). These findings, in a relatively well studied leafhopper tribe, show that the leafhopper fauna of Thailand (and South East Asia in general) is poorly known, and that there is a rich fauna to be discovered there, as in neighboring China (see Zhang & Duan, 2011). All new taxa, *Maiestas scripta* (Distant), species of *Matsumuratettix* Metcalf, and *Polyamia acicularis* Dai, Xing & Li are distinctive in having numerous extra cross veins on the forewing.

Material and methods

The material studied here is deposited in the Queen Sirikit Botanical Garden, Chiang Mai, Thailand (QSBG), Illinois Natural History Survey (INHS), and The Natural History Museum, London, United Kingdom (BMNH). Morphological terminology follows Dietrich (2005). Digital photographs were taken with a QImaging Micropublisher 3.3 digital camera mounted on an Olympus BX41 stereo microscope and with a Nikon D1x digital SLR camera configured with lenses by Microptics, Digital Lab XLT system. Photographs were modified with Adobe Photoshop CS.

Taxonomy

Subfamily Deltocephalinae

Tribe Deltocephalini

Checklist to Deltocephalini from Thailand

Note. Although *Alobaldia tobae* (Matsumura, 1902) was indicated (on a map) to occur throughout East Asia (including Thailand) by Lee (1979: 417), it was not included in his distribution list in the same publication (page 879) and is omitted here. References that include figures of the species are given after species listed below.

Deltocephalus infirmus Melichar, 1903; Ishihara, 1961 (Thailand); Webb & Viraktamath, 2009: 13, Fig. 10.

Deltocephalus vulgaris Dash & Viraktamath, 1998: 4, Figs 1–11; Zhang & Duan, 2011: 5, Fig. 3, Plate I: C & D, Plate V: B, Plate VI: B. **New record**

Loeia tampti **gen. nov., sp. nov.**

Maiestas distincta (Motschulsky, 1859); Ishihara, 1961 (Thailand); Webb & Viraktamath, 2009: 16, Fig. 34.

Maiestas dorsalis (Motschulsky, 1859); Ishihara, 1961 (Thailand); Webb & Viraktamath, 2009: 16, Fig. 36.

Maiestas dinghuensis Zhang & Duan, 2011: 34, Fig. 30, Plate IV: B. **New record**

Maiestas portica (Melichar, 1903); Ishihara, 1961 (Thailand, as *Deltocephalus intermedius* Melichar); Webb & Viraktamath, 2009: 41, Figs 25–31.

Maiestas scripta (Distant, 1908); Webb & Viraktamath, 2009: 41, Fig. 33. **New record**

Maiestas serrata Duan & Dietrich, 2017: 61, Figs 1–2 (Thailand).

Maiestas subsirii **sp. nov.**

Matsumuratettix hiroglyphicus (Matsumura, 1914); Webb & Viraktamath, 2009: 8, Fig. 46.

Matsumuratettix jaruphani Duan, 2016, in Duan, Dietrich & Zhang, 2016a: 398, Figs 1–2 (Thailand).

Miradeltaphus sanogae Duan, 2016, in Duan, Dietrich & Zhang, 2016b: 160, Figs 1–2 (Thailand).

Paramesodes **sp. New record of genus**

Phetchabunia janteabi **gen. nov., sp. nov.**

Polyamia acicularis Dai, Xing & Li, 2010: 571, Fig. 1–7. **New record**

Yuanamia producta (Xing & Li, 2011, in Li, Dai & Xing, 2011); Duan, Dietrich & Zhang, 2016b: 164, Figs 5–6 (Thailand).

Key to Deltocephalini from Thailand

1. Forewing with extra cross veins (Figs 1A–B; 3A–B; 5A–B). 2
- Forewing without extra cross veins. 8
2. Crown more than 2x as long as width between eyes (Fig. 3A). *Phetchabunia janteabi* **gen. nov., sp. nov.**
- Crown at most as long as broad between eyes. 3
3. Crown shorter medially than next to eye, anterior and posterior margins sub-parallel (Fig. 1A). *Loeia tampti* **gen. nov., sp. nov.**
- Crown distinctly longer medially than next to eye. 4
4. Aedeagal shaft needle-like. *Polyamia acicularis*
- Aedeagal shaft not as above. 5
5. Crown conspicuously marked with brown, lower half of face completely brown, markings on anterior margin forming three yellow transverse spots and on crown forming subapical central yellow spot. *Maiestas scripta*
- Crown not marked as above. 6
6. Forewing marked with dark brown spots (Fig. 5A). 7
- Forewing not marked with dark brown spots. *Matsumuratettix jaruphani*
7. Subgenital plate macrosetae marginal (Fig. 6C); aedeagal shaft cylindrical (Fig. 6F). *Maiestas subsirii* **sp. nov.**
- Subgenital plate macrosetae central on plate; aedeagal shaft laterally compressed. *Matsumuratettix hiroglyphicus*
8. Forewing marked with a zig-zag brown marking. *Maiestas dorsalis*
- Forewing not marked as above. 9
9. Crown not or only very slightly produced medially, with a dark brown transverse band on disc. *Paramesodes* **sp.**
- Crown distinctly produced medially, without a transverse dark brown band on disc. 10

10.	Anterior margin of crown dark brown with transverse row of white spots.	<i>Maiestas distincta</i>
-	Crown not marked as above.	11
11.	Face marked with dark brown spot below antennae and central brown spot on crown, or if spot on crown absent then crown without marking.	<i>Maiestas portica</i>
-	Face and crown not marked as above.	12
12.	Subgenital plates fused to valve.	<i>Miradeltaphus sanogae</i>
-	Subgenital plates not fused to valve.	13
13.	Aedeagal shaft curved dorsally with apical gonopore.	14
-	Aedeagal shaft at most shallowly curved dorsally with gonopore apical on dorsal surface (Fig. 6F)	15
14.	Aedeagal shaft with an apical notch.	<i>Deltocephalus vulgaris</i>
-	Aedeagal shaft without an apical notch.	<i>Deltocephalus infirmus</i>
15.	Aedeagal shaft very elongate, bifurcate apically.	<i>Yuanamia producta</i>
-	Aedeagal shaft short to moderately long not bifurcate apically (Figs 6E–F)	16
16.	Aedeagus with well-developed basal heel.	<i>Maiestas dinghuensis</i>
-	Aedeagus without developed basal heel.	<i>Maiestas serrata</i>

***Loeia* Duan gen. n.**

Type species: *Loeia tamtipi* Duan sp. n.

Coloration and morphology. Whitish yellow with orange and fuscous marks. Crown slightly wider than pronotum. Crown short, only slightly longer medially than length of inner eye margin with basal width about twice length of inner eye margin, depressed, anterior margin in dorsal view slightly angularly produced; texture glabrous posteriorly; transition from crown to face rounded; ocellus next to eye on anterior margin. Face wider than long, relatively flat; frontoclypeus relatively narrow, slightly tapered ventrally; anteclypeus slightly widening towards apex, lateral margins slightly convex, not extending to ventral margin of genae; lorum relatively broad, well separated from genal margin. Forewing with numerous incomplete cross veins, with four apical and three subapical cells, inner subapical cell closed basally, outer subapical cell extended to costal margin near midlength and petiolate apically; appendix narrow. Front femur row AV with ~8 short, stout setae in basal half and long AV1 near apex; AM1 enlarged, near midheight, well separated from apex; intercalary row with ~10 fine pale setae; tibial rows AD and PD with 1 and 15–18 macrosetae, respectively. Hind femur setal formula 2+2+1, tibial rows PD, AD and AV with approximately 12, 9 and 20 macrosetae, respectively; PD and AD with 1–4 shorter setae between successive macrosetae; PD macrosetae ~50% longer than AD macrosetae; tarsomere I with two well developed plantar rows of stout setae, pecten with three platellae.

Male genitalia. Pygofer with posterior lobe very long and tapered; with numerous long thin macrosetae; with stout acute ventral process arising near base of lobe, curved inwards. Subgenital plate broad basally with very long digitate apical region; with few lateral thin macrosetae in single row near base. Style basal arms widely separated, articulating arm long, lateral arm short; preapical lobe well developed, broadly triangular; apophysis relatively short and stout, curved laterally and tapered to acute apex with subapical mesal heel. Connective shorter than aedeagus, linear with arms joined anteriorly. Aedeagus with shaft moderately long, curved dorsally and slightly compressed dorso-ventrally; with pair of apical processes arising dorsolaterally; gonopore apical; basal apodeme moderately long. Anal tube short and weakly sclerotized.

Remarks. In the key to genera of Oriental and Palaearctic Deltocephalini by Duan *et al.* (2016b) *Loeia* keys out to *Miradeltaphus* Dash & Viraktamath but may be separated from this and other Deltocephalini genera by the following combination of features: crown short; anteclypeus widening towards apex; lorum relatively large; forewing with numerous incomplete cross veins thickened with white marking; male pygofer with posterior lobes very long and tapered, with ventral processes; subgenital plate with long digitate apical region; aedeagus with pair of apical processes arising dorsolaterally, gonopore apical.

Etymology. This genus is named for the type locality of the type species, gender feminine.

***Loeia tamtipi* Duan sp. n.**

(Figs 1–2)

Length. Male: 5.9 mm.

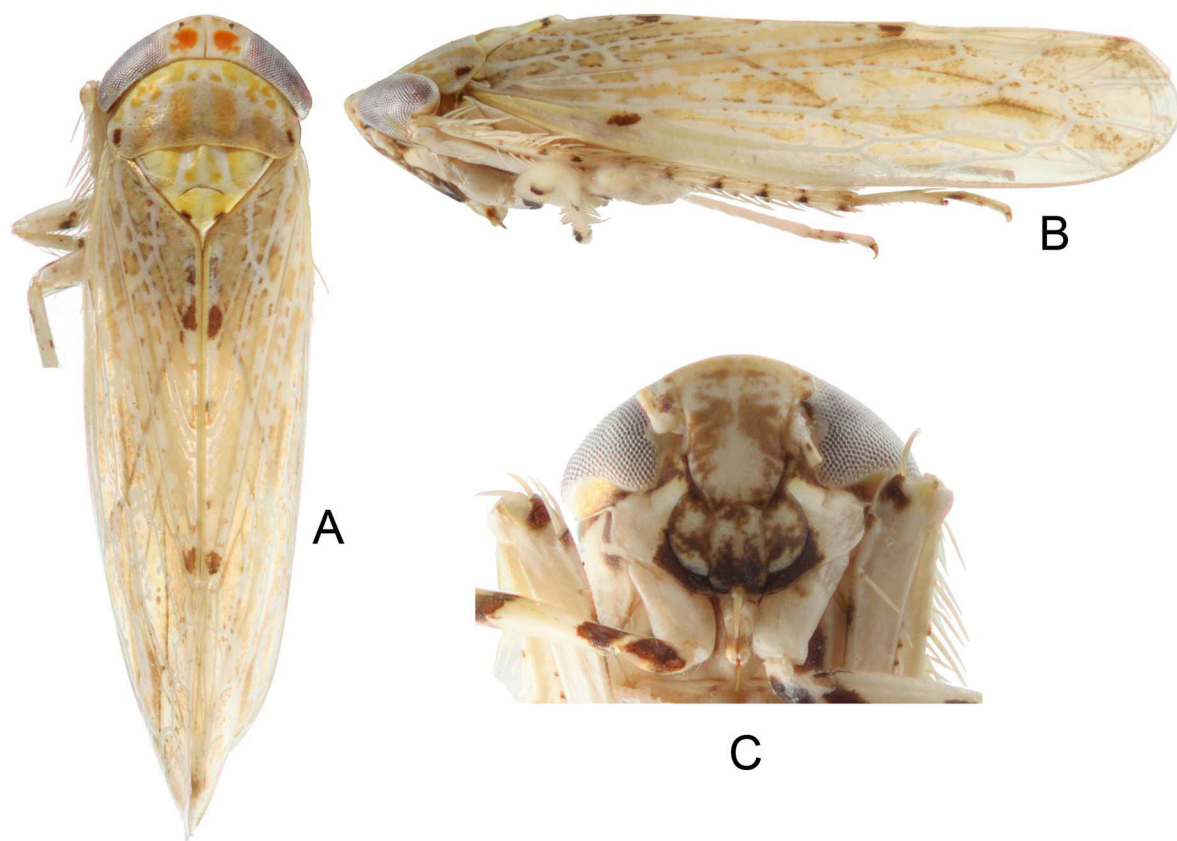


FIGURE 1. *Loeia tamtipi* Duan sp. n. A: habitus, dorsal view; B: habitus, lateral view; C: face.

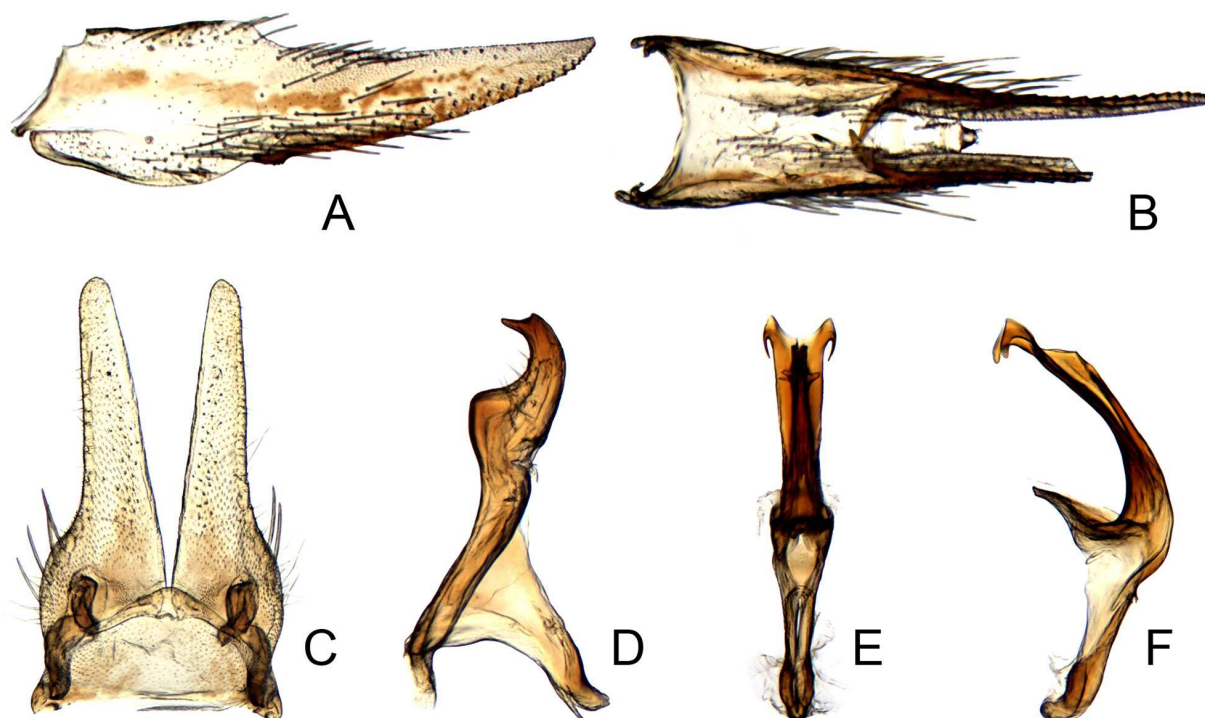


FIGURE 2. *Loeia tamtipi* Duan sp. n. A: male pygofer lobe, lateral view; B: male pygofer and segments X–XI, ventral view; C: valve and subgenital plates, ventral view; D: style, dorsal view; E, F: connective and aedeagus, dorsal and lateral view, respectively.

Coloration and morphology. Crown with two brown dots on anterior margin equidistant from mid-line to eye and two orange patches more posterad (Fig. 1A). Face with paired brown arcs on frontoclypeus; lower area of face mottled with dark brown (Fig. 1C). Pronotum with brown anterior patches; posteriorly pale brown with dark brown lateral spot and four short dark brown bands. Mesonotum with central area and basal triangles brown (Fig. 1A). Forewing membrane brownish hyaline contrasting with white veins; with dark brown patch at apex and middle of claval margin and another patch subapically on corium. Legs with setal bases brown (Fig. 1A–B).

Male genitalia. Male genitalia as in generic description; aedeagal shaft narrowed at midlength in lateral view, broadening from base to apex in ventral view; apical processes short, curved dorsad, hook-like (Fig. 2E–F).

Material examined. Holotype, male, Thailand: Loei Phu Ruea NP office, 17°28.805'N, 101°21.242'E, 870 m, Malaise trap, 12–19 vii 2006, Patikhom Tamtip, leg. T315 (QSBG).

Etymology. This species is named after Patikhom Tamtip who collected the type specimen.

***Phetchabunia* Duan gen. n.**

Type species: *Phetchabunia janteabi* Duan sp. n.

Coloration and morphology. Brown with orange and fuscous marks. Crown narrower than pronotum. Crown very long, approximately 2½ times length of inner eye margin with basal width similar in length to inner eye margin, depressed, spatulate, anterior margin in dorsal view tapered to narrowly rounded apex slightly angulate subapically, texture uniformly shagreen, transition from crown to face narrowly angulate; ocellus next to eye on anterior margin. Face length nearly twice width, relatively flat; frontoclypeus relatively narrow, slightly tapered ventrally; anteclypeus parallel-sided, extended to ventral margin of genae; gena broad, insinuated near eye; lorum narrower, well separated from genal margin. Forewing with numerous extra cross veins and four apical and three subapical cells, inner subapical cell closed basally; appendix narrow. Front femur row AV with ~17 short, stout setae in basal half, AV1 weakly differentiated, AM1 near ventral margin well separated from apex; intercalary row with ~5 fine setae; tibia rows PD and AD each with 4 macrosetae. Hind femur macrosetal formula 2+2+1; tibia rows PD, AD and AV with approximately 8, 11 and 14 macrosetae; PD and AD with 1–5 smaller setae between successive macrosetae; PD macrosetae distinctly longer than those of AD; tarsomere I with two distinct plantar rows of stout setae, pecten with three platellae.

Male genitalia. Pygofer lobe tapered; without processes; with numerous macrosetae. Subgenital plates fused to each other through most of length, lateral margin concave; without lateral macrosetae. Style narrow through most of length, basal arms widely separated, articulating arm long, lateral arm very short; preapical lobe weak; apophysis thick finger-like. Connective equal in length to aedeagus, linear with arms joined distally. Aedeagus with shaft moderately long, very slightly curved dorsally; with pair of lateroapical processes; gonopore apical; basal apodeme vestigial; anal tube moderately long and well sclerotized dorsally.

Remarks. This genus forms a group with Old World Deltocephalini genera *Miradeltaphus* Dash & Viraktamath and *Peitouellus* Vilbaste all having the subgenital plates fused basally. It is similar to *Yuanamia* Zhang & Duan in the apical position of the aedeagal processes but differs from that genus and others in its very long, spatulate crown and in lacking macrosetae on the subgenital plate.

Etymology. This genus is named for the type locality of the type species, gender feminine.

***Phetchabunia janteabi* Duan sp. n.**

(Figs 3–4)

Length. Male: 4.7 mm.

Coloration and morphology. Dorsum with pair of orange longitudinal submedial bands extended from crown to mesonotum. Crown with six dark brown patches on anterior margin (Fig. 3A). Face dark brown with transverse paired pale arcs on frontoclypeus (Fig. 3C). Pronotum with two orange longitudinal bands laterad of submedial bands. Mesonotum with central area and basal triangles orange (Fig. 3A). Forewing brownish hyaline with veins contrastingly pale; with dark brown patch at middle of claval suture and another patch at apex of inner subapical cell. Legs with setal bases brown (Fig. 3A–B).

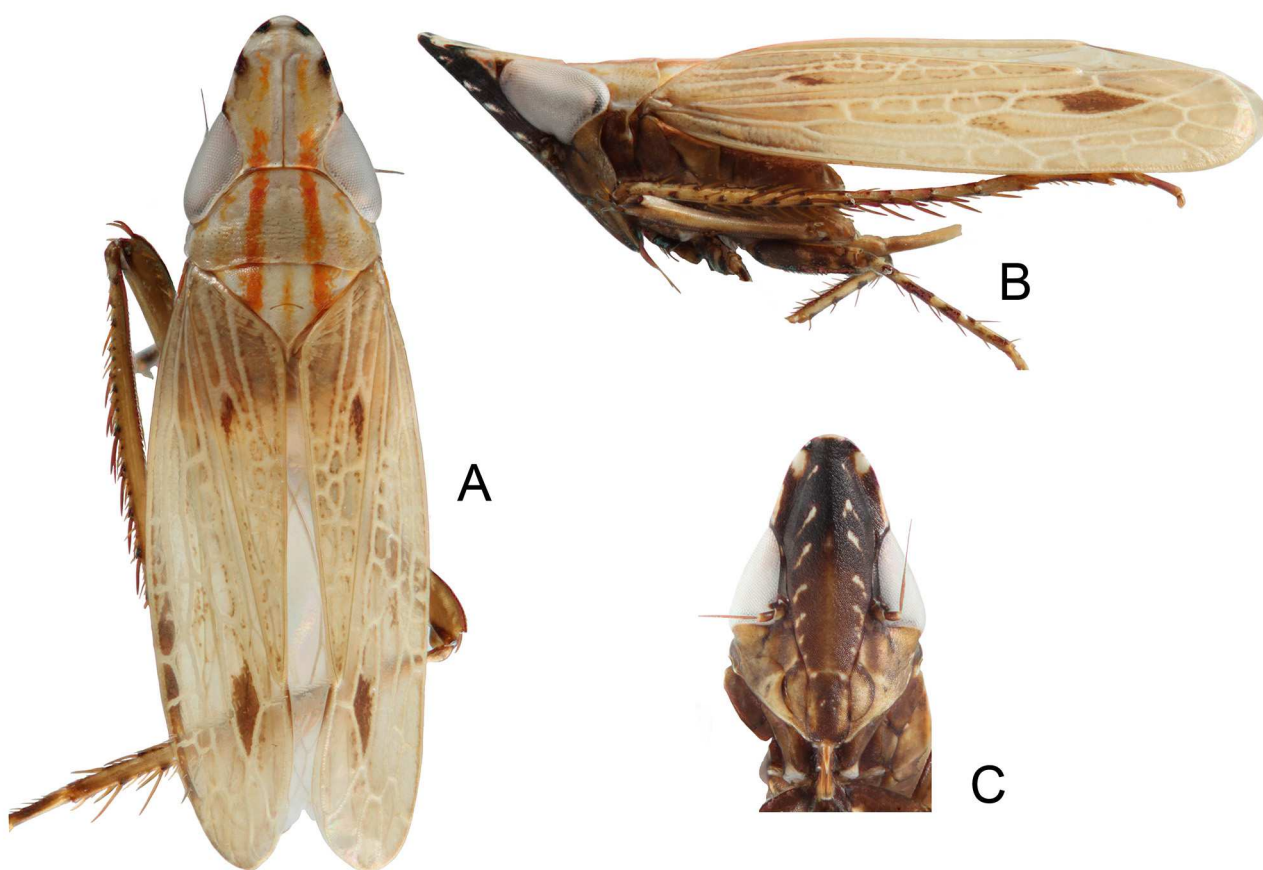


FIGURE 3. *Phetchabunia janteabi* Duan sp. n. A: habitus, dorsal view; B: habitus, lateral view; C: face.

Male genitalia. Male genitalia as in generic description; aedeagal shaft nearly parallel sided; apical processes moderately long and straight (Fig. 4F–G).

Material examined. Holotype: male, Thailand: Phetchabun Nam Nao Np Pine forest/Sambon 3, 16°42.41'N, 101°35.3'E, 868 m, Malaise trap, 2–9 x 2006, Leng Janteab, leg. T4984 (QSBG).

Etymology. This species is named for Leng Janteab who collected the type specimen.

***Maiestas subsirii* Duan sp. n.**

(Figs 5–6)

Length. Male: 3.6 mm.

Coloration and morphology. Pale yellow with brown marks. Crown with one brown dot on either side of median line on anteriorly, with three light brown patches (Fig. 5A). Face with paired white arcs on frontoclypeus (Fig. 5C). Pronotum with six light brown longitudinal bands. Mesonotum with central area and basal triangles light brown (Fig. 5A). Forewing brownish hyaline contrasting with white marking on veins; with a dark brown patch at middle of claval suture and another patch at m-cu1 (Fig. 5A–B). Legs with setal bases brown (Fig. 5B). Crown wider than pronotum. Crown depressed, anterior margin distinctly angulate in dorsal view, as long as distance between eyes (Fig. 5A). Anteclypeus tapering, not extended to ventral margin of genae (Fig. 5C). Forewing with numerous extra cross veins and four apical and three subapical cells, inner subapical cell closed basally; appendix narrow (Fig. 5A–B).

Male genitalia. Pygofer with posterior lobes moderately long and equilateral triangle; with numerous macrosetae (Fig. 6A). Subgenital plate subtriangular, lateral margin concave; with few lateral macrosetae (Fig. 6C). Style basal arms widely separated, articulating arm moderately long, lateral arm short; preapical lobe well

developed, broadly triangular; apophysis relatively short and slim, slightly laterally curved (Fig. 6D). Connective nearly as long as aedeagus, linear with arms joined distally. Aedeagus with shaft short, slightly curved dorsally; without processes; with ventral margin extending beyond gonopore; gonopore subapical on dorsal surface (Fig. 6E–F).

Material examined. Holotype: male, Thailand: Ubon Ratchathani Pha Taem NP Don Rong pond, 15°24.582'N, 105°30.935'E, 250 m, Malaise trap, 3–10 ii 2007, Bunlu Subsiri, leg. T1664 (QSBG).

Etymology. This species is named for Bunlu Subsiri who collected the type specimen.

Remarks. Externally, this species resembles *Maiestas pruthii* (Metcalf), *M. parapruthii* (Chalam & Rao) and *M. menoni* (Rao & Ramakrishnan) in having numerous extra cross veins in the forewing, but the latter three species have noticeably fewer cross veins and differ in the structure of the pygofer and aedeagus. Some other genera of Deltocephalini, including the two new genera described here, *Matsumuratettix* Metcalf and *Polyamia* DeLong, also have supernumerary forewing cross veins.

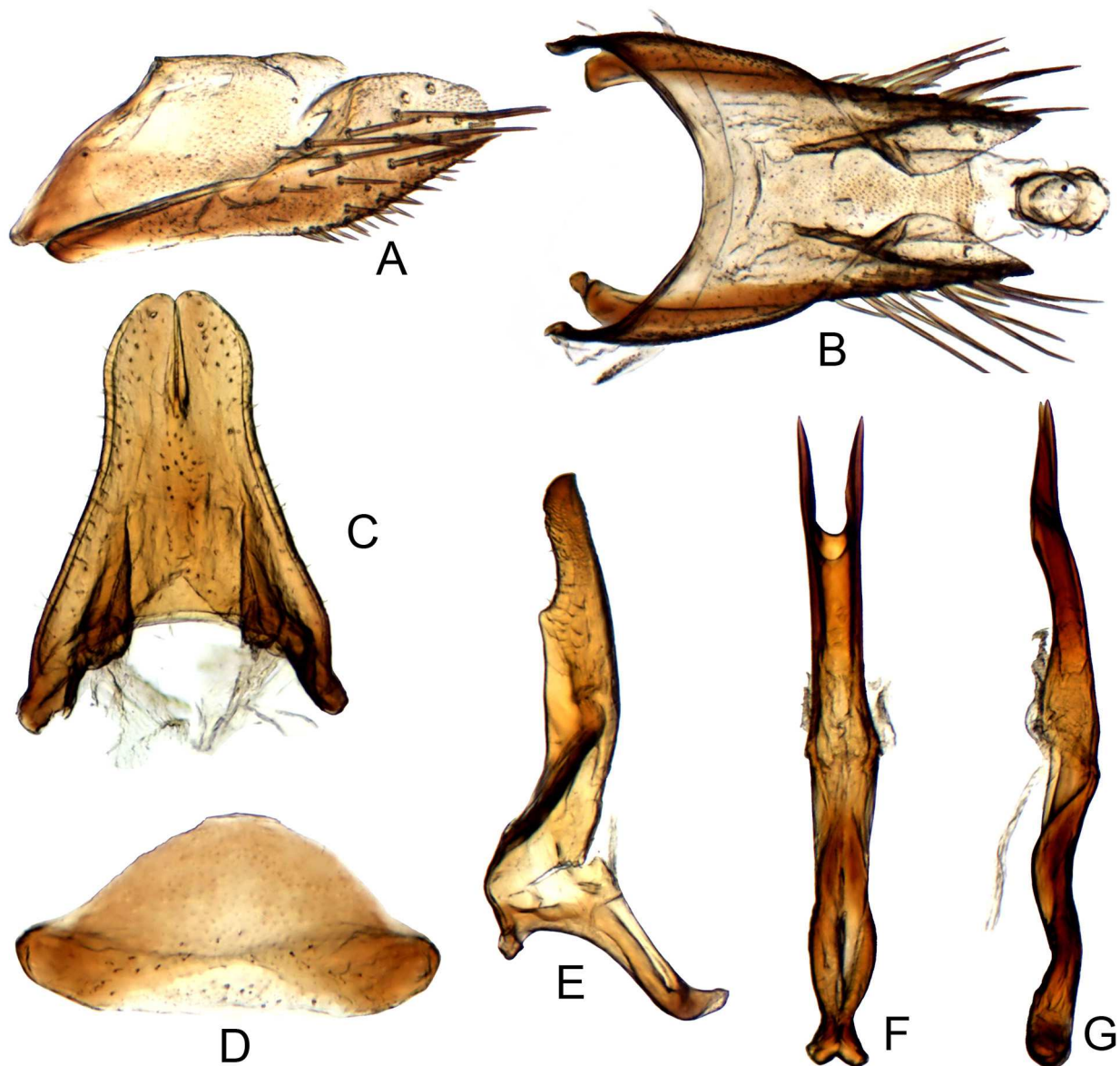


FIGURE 4. *Phetchabunia janteabi* Duan sp. n. A: male pygofer lobe, lateral view; B: male pygofer and segments X–XI, dorsal view; C: fused subgenital plates, ventral view; D: valve, ventral view; E: style, dorsal view; F, G: connective and aedeagus, dorsal and lateral view, respectively.

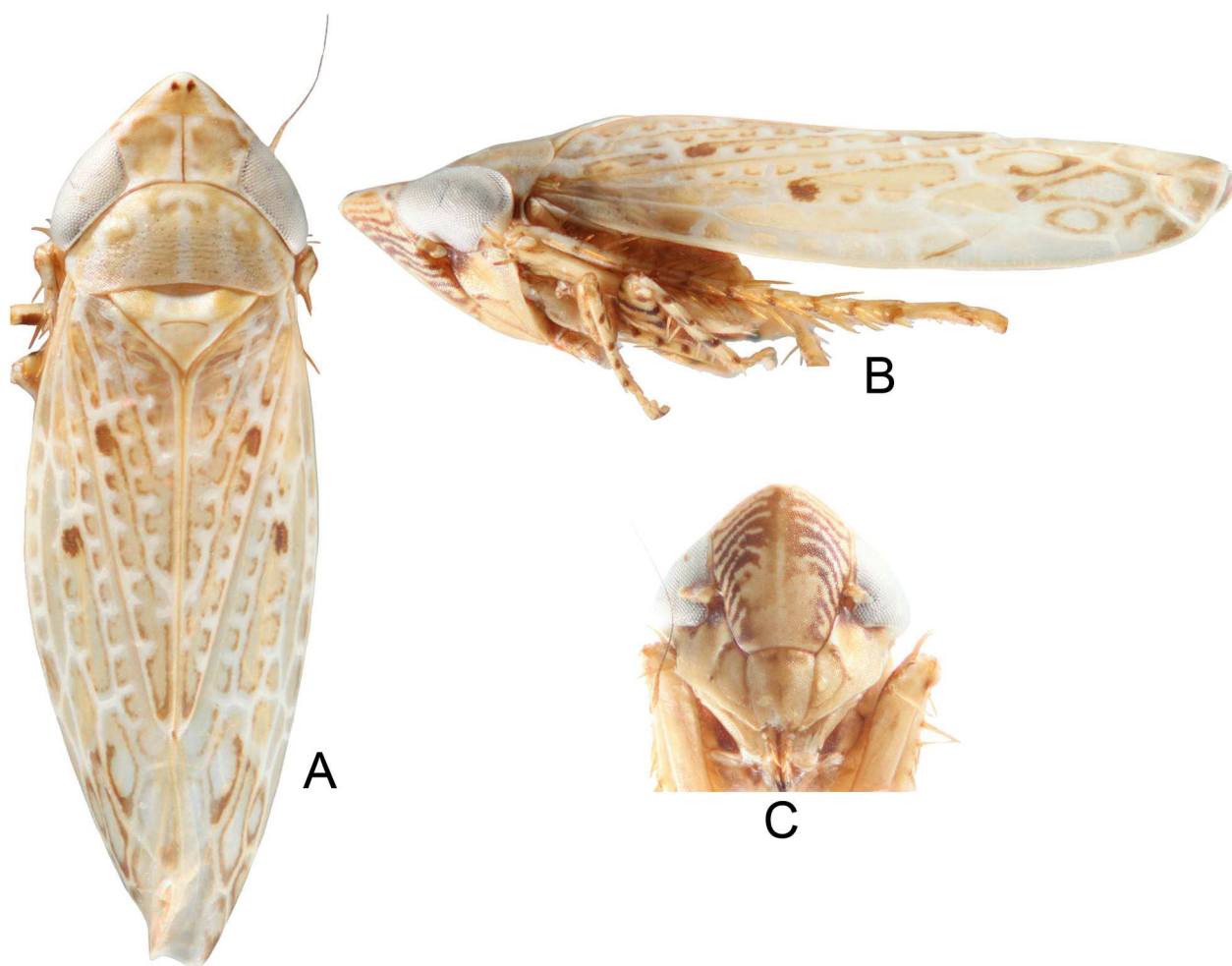


FIGURE 5. *Maiestas subsirii* Duan **sp. n.** A: habitus, dorsal view; B: habitus, lateral view; C: face.

New records for Thailand

***Deltocephalus vulgaris* Dash & Viraktamath, 1998. New record**

Deltocephalus vulgaris Dash & Viraktamath, 1998: 4, Figs 1–11; Zhang & Duan, 2011: 5, Fig. 3, Plate I: C & D, Plate V: B, Plate VI: B.

Material examined. 1 male, Thailand: Surat Thani, Khao Sok NP Klong Morg Unit, 8°53.725'N, 98°39.025'E, 87 m, Malaise trap, 10–17 viii 2008, Pongphan, leg. T3365; 1 male, Thailand: Nakhon Nayok, Khao Yai NP secondary dry evergreen forest, 14°24.784'N, 101°22.593'E, 757 m, Malaise trap, 5–12 i 2007, Pong Sandao, leg. T1411; 1 male, Thailand: Lampang, Chae Son NP Nursery, 18°49.851'N, 99°28.122'E, 485 m, Malaise trap, 1–7 xi 2007, Bunruen Kwunnui & Acharaporn Sukpeng, leg. T2818 (QSBG, INHS).

Remarks. This species, originally recorded from India, was treated by Zhang & Duan (2011) from China.

***Maiestas dinghuensis* Zhang & Duan, 2011. New record**

Maiestas dinghuensis Zhang & Duan, 2011: 34, Fig. 30, Plate IV: B.

Material examined. 1 male, Thailand: Phetchabun, Nam Nao NP Helicopter landing ground, 16°43.113'N, 101°35.134'E, 889 m, Malaise trap, 3–10 vii 2006, Noopean Hongyothi, leg. T270 (INHS).

Remarks. This species was previously recorded only from southern China.

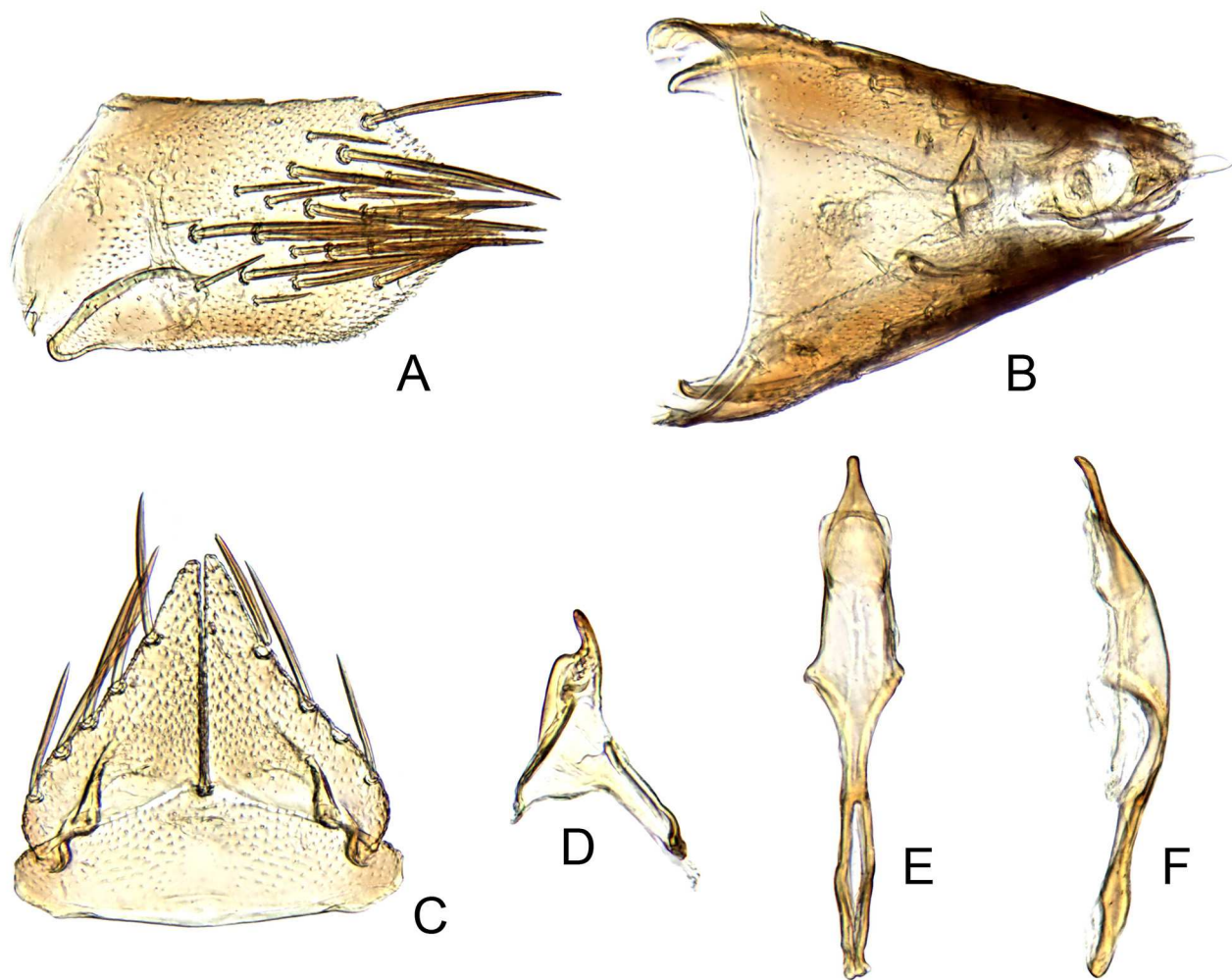


FIGURE 6. *Maiestas subsirii* Duan sp. n. A: male pygofer lobe, lateral view; B: male pygofer and segments X–XI, dorsal view; C: valve and subgenital plates, ventral view; D: style, dorsal view; E, F: connective and aedeagus, dorsal and lateral view, respectively.

***Maiestas scripta* (Distant, 1908). New record**

Deltocephalus scriptus Distant, 1908: 389.

Maiestas scripta, Webb & Viraktamath, 2009: 41, Fig. 33.

Material examined. 1 male, Thailand: Krung Thep Maha Nakhon Prov., Bangkok, 16 viii 1965, at light (BMNH).

Remarks. This species was previously known only from Sri Lanka.

***Paramesodes* sp. new genus record**

Remarks. Several specimens of this genus from Thailand have been examined (INHS) but these cannot be reliably identified at present. Previously recognized species boundaries in *Paramesodes* (Wilson, 1983; Li, Dai & Xing, 2011; Duan & Zhang, 2012) are based mostly on slight differences in the shape of the pygofer processes and, in many cases, based on single specimens or specimens from a single locality and therefore with little information on intraspecific variation.

***Polyamia acicularis* Dai, Xing & Li, 2010. New record**

Polyamia acicularis Dai, Xing & Li, 2010: 571, Fig. 1–7.

Material examined. 1 male, Thailand: Phetchabun, Khao Kho NP, mix deciduous, 16°39.572'N, 101°8.194'E, 171 m, Malaise trap, 5–12 i 2007, Somchai Chachumnan & Saink Singtong, leg. T1391; 1 male, Thailand: Chaityaphum, Pha Hin Ngam NP, Savanna/Tepa waterfall, 15°38.95'N, 101°25.63'E, 604 m, Malaise trap, 13–19 iv 2007, Katae Sa-nog & Buakaw Adnafai, leg. T5006; 3 males, Thailand: Chaityaphum, Pa Hin Ngam NP, ecotone between mix deciduous and dipterocarp forest, 15°38.1'N, 101°23.857'E, 700 m, Malaise trap, 19–25 ii 2007, Katae Sa-nog & Buakaw Adnafai, leg. T1651 (QSBG, INHS).

Remarks. This species was previously recorded only from Jiangxi, China.

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