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A KEY TO THE GENERA OF EMPOASCINI (HEMIPTERA: CICADELLIDAE: TYPHLOCYBINAE) IN CHINA, WITH DESCRIPTIONS OF TWO NEW GENERA AND TWO NEW SPECIES

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ABSTRACT

Two new microleafhopper genera, *Keumiata* Qin & Dietrich **gen. nov.** and *Flaviata* Lu & Qin **gen. nov.** are described based on 2 new species, *K. orientalis* Qin & Dietrich **sp. nov.** and *F. variata* Lu & Qin **sp. nov.** from southwest China and Thailand. Both new genera are assigned to the typhlocybine tribe Empoascini. A key to the known genera of the tribe from China is provided and the differences between each new genus and closely related genera are discussed.

Key Words: Auchenorrhyncha, leafhopper, new taxa, taxonomy, key

RESUMEN

Se describen dos nuevos géneros de microsaltahojas, *Keumiata* Qin & Dietrich **gen. nov.** y *Flaviata* Lu & Qin **gen. nov**. en base a 2 especies nuevas, *K. orientalis* Qin & Dietrich **sp. nov.** y *F. variata* Lu & Qin **sp. nov.** del suroeste de China y Tailandia, los dos nuevos géneros se asignan a la tribu typhlocybine de Empoascini. Se incluye una clave de los géneros conocidos en China de esta tribu y se discuten las diferencias entre cada nuevo género y otros géneros estrechamente relacionados.

Palabras Clave: Auchenorrhyncha, saltahojas, nuevos taxones, taxonomía, clave

The microleafhopper tribe Empoascini is a large group of the subfamily Typhlocybinae (Hemiptera: Cicadellidae). It was established by Distant (1908) to include the genera *Homa* Distant, *Empoasca* Walsh and *Heliona* Melichar, but various subsequent authors have disagreed over its status and composition (see McAtee 1934; Oman 1949; Young 1952, 1965; Metcalf 1964; Mahmood 1967; Mahmood & Ahmed 1968; Dworakowska 1979; Ahmed 1983). In his comprehensive review of New World Typhlocybinae, Young (1952) treated Empoascini as a junior synonym of Typhlocybini but Mahmood & Ahmed (1968) included the genera of *Empoasca* complex in the tribe Empoascini, and Dworakowska (1979) further refined the definition of Empoascini to accommodate genera lacking an appendix of the forewing and having the submarginal vein in the hind wing reaching but not exceeding the vein RP+MP' or RP (Dworakowska 1979). Dietrich (2013b) adopted the classification of Ahmed (1983), which recognizes 5 tribes in the subfamily and distinguishes Empoascini from other leafhoppers in the subfamily by the absence of an appendix on the forewing and in having the submarginal vein between apices of veins MP' or RP+MP' and MP"+CuA' in the hind wing. Dietrich (2013a) recognized 2 new genera of Typhlocybinae with hind wing venation identical to that of *Empoasca* but included these genera in Dikraneurini based on characters of the head and male genitalia. Additional features distinguishing Empoascini from Dikraneurini include the presence of well-developed ocelli (vestigial or absent in Dikraneurini), presence of a pair of lobes or processes at the base of the male anal tube (absent in Dikraneurini), absence of a well-developed preapical lobe on the male paramere (present in Dikraneurini), and presence of numerous macrosetae on the subgenital plate (few or none in Dikraneurini).

Because the tribal classification has undergone a great deal of addition and revision over the past 100 years, the tribal placements of some described genera in the subfamily remain unresolved and need to be reconsidered. Recently, Catalano et al. (2014) reviewed 2 Neotropical genera,

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Paulomanus and *Beamerana*, both described by Young (1952) and placed in the tribe Typhlocybini (*sensu lato*). Catalano et al. placed *Paulomanus* and *Beamerana* in the tribe Empoascini because their hind wing venation is nearly identical to that of *Empoasca* (i.e., with a single large, closed apical cell). A similar situation occurs in some described genera in the Oriental Region, including *Dapitana* Mahmood (1967), *Pemoasca* Mahmood (1967), *Rabiana* Mahmood (1967), *Serratulus* Mahmood (1967), *Mindanaoa* Mahmood (1967) and *Mahmoodia* Dworakowska (1970a), which were originally included in Typhlocybini (*sensu lato*), but also have the hind wing submarginal vein present and connecting the apices of veins RP+MP'. Therefore, it is appropriate to include them in Empoascini. Thus, the tribe Empoascini now comprises 81 previously described genera, 64 of which are known in the Oriental Region and 34 genera have been reported in China (Lu & Qin 2014a, b; Liu et al. 2014). This paper adds 2 new genera and 2 new species based on our recent examination of materials collected from southern China and Thailand with a key to the known genera of the tribe from China.

Material and Methods

The specimens examined in this study are deposited in the Entomological Museum, Northwest A & F University, Yangling, Shaanxi, China (NWAFU) and the insect collection of the Illinois Natural History Survey, Champaign, Illinois (INHS) as indicated under each species. The methods and terminology used in this work follow Zhang (1990) with the following exceptions: wing venation follows Dworakowska (1993), groups of setae on the subgenital plate follow Southern (1982), leg chaetotaxy follows Rakitov (1998).

Key to the Genera of Chinese Empoascini (Males)

1. Hind wing with CuA branched (Figs. 1-4). 2

—. Hind wing with CuA unbranched (Figs. 5-9). 14

2. Coronal suture long, extended onto face and terminating at level of antennal bases (Figs. 28, 29) . . . . . *Apheliona* Kirkaldy

—. Coronal suture short, at most reaching anterior margin of crown (Figs. 30, 31, 32, 115, 135, 137). . . 3

3. Anal tube appendage absent (Figs. 40, 41) 4

—. Anal tube appendage present (Figs. 42-45, 118, 123, 134, 144, 145, 155). 5

4. Crown-face transition with dark patch medially; forewing with veins MP' and RP separate, connected by crossvein (Fig. 10); male pygofer in profile strongly emarginate dorsally (Fig. 40). . . . . *Membranacea* Qin & Zhang

—. Crown-face transition without dark patch medially; forewing with veins MP' and RP confluent preapically (Fig. 11); male pygofer in profile not emarginate dorsally (Fig. 41) . . . . . *Alebrasca* Hayshi & Okada

5. Hind wing with bifurcation point of CuA at or basad of coalescence of CuA with MP" (Figs. 1, 143) 6

—. Hind wing with bifurcation point of CuA drawn apicad (Figs. 2-4, 122). 7

6. Crown produced, anterior and posterior margins not parallel (Fig. 30); upper pygofer appendage absent (Fig. 42); paramere serrated apically (Fig. 103) . . . . . *Alebroides* Matsumura

—. Crown not produced, anterior and posterior margins parallel (Figs. 135, 137); upper pygofer appendage present (Figs. 139, 140, 144-148); paramere smooth, not serrated apically (Fig. 154) . . . . . *Flaviata* Lu & Qin **gen. nov.**

7. Setal group A present on subgenital plate (Figs. 58, 59, 123, 131) 8

—. Setal group A absent on subgenital plate (Figs. 60, 61) 12

8. Male pygofer with ventral appendage (Figs. 43, 44). 9

—. Male pygofer without ventral appendage (Figs. 45, 118, 123, 125) 10

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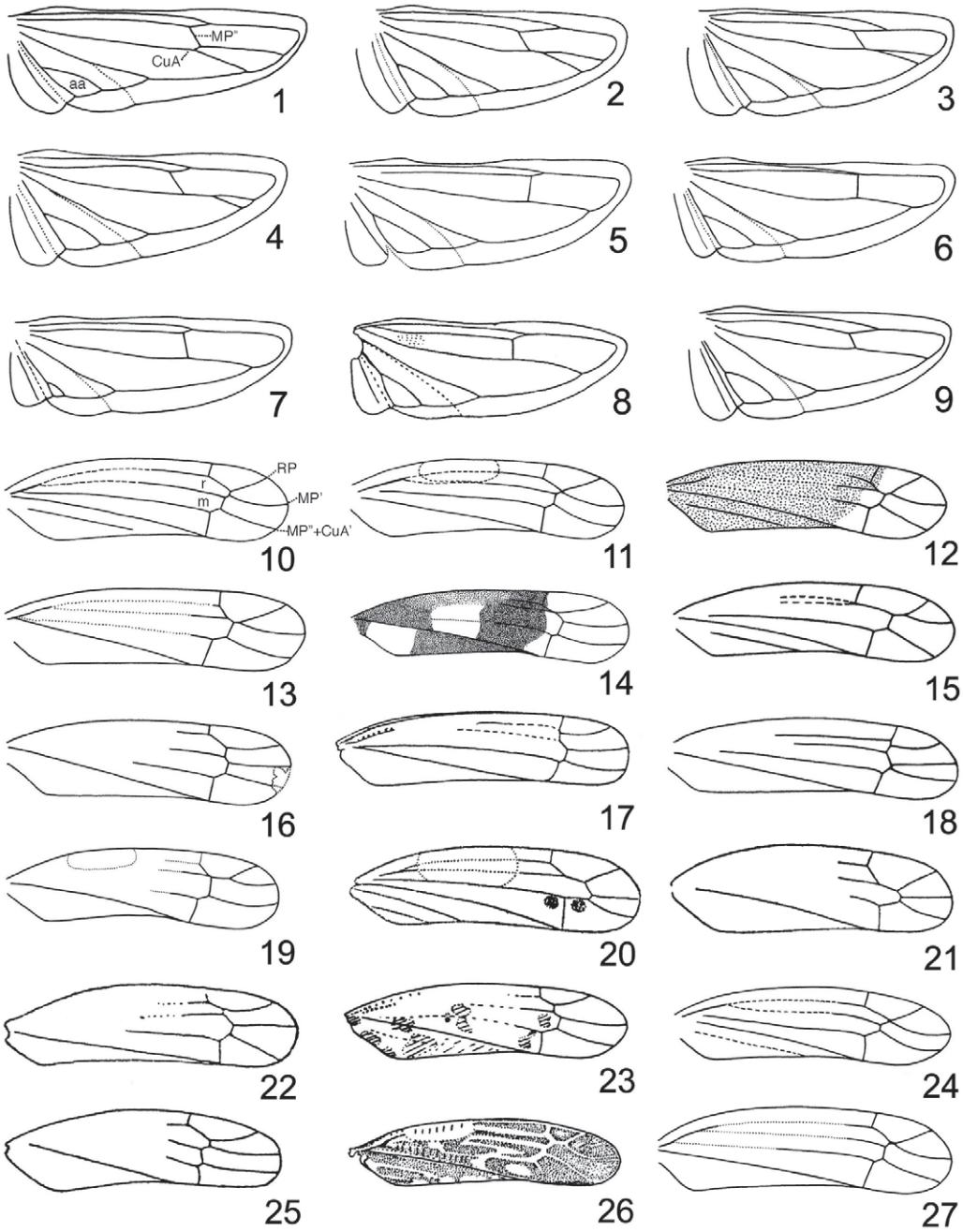

Figs. 1-27. 1. *Alebroides muzitaneus* Qin & Zhang; 2. *Schizandrasca ussurica* (Vilbaste); 3. *Luodianasca recurvata* Qin & Zhang; 4. *Nikkotettix cuspidata* Qin & Zhang; 5. *Ishiharella hastata* Qin & Zhang; 6. *Velu longiprojectum* Zhang & Qin; 7. *Radicafurcus breviprocessus* Qin & Zhang; 8. *Helionides exsultans* (McAtee) (after Dworakowska, 1981a); 9. *Empoasca* (*Matsumurasca*) *quadrialata* Qin & Zhang; 10. *Membranacea spinata* Qin & Zhang; 11. *Alebrasca actinidiae* Hayashi & Okada; 12. *Baguoidea yunnanensis* Qin & Zhang; 13. *Dayus lii* Qin & Zhang; 14. *Homa sinensis* Qin & Zhang; 15. *Goifa tangailensis* (Ahmed & Samad); 16. *Treufalka lamellata* Qin & Zhang; 17. *Usharia mata* Dworakowska (after Dworakowska, 1977); 18. *Ifugoa mikra* Dworakowska & Pawar; 19. *Velu furcatum* Zhang & Qin; 20. *Kyboasca sexevidens* Dlabola (after Anufriev & Emeljanov, 1988); 21. *Austrasca soembawaica* Dworakowska (after Dworakowska, 1970b); 22. *Jacobisaca jamesi* Ahmed (after Ahmed, 1979); 23. *Amrasca uvka* Dworakowska (after Dworakowska, 1977); 24. *Sikkimasca annulata* Dworakowska; 25. *Heliona constricta* Melichar (after Dworakowska, 1994a); 26. *Helionides exsultans* (McAtee) (after Dworakowska, 1981a); 27. *Empoasca* (*Matsumurasca*) *biloba* Qin & Zhang. 1-9: hind wing; 10-27: forewing.

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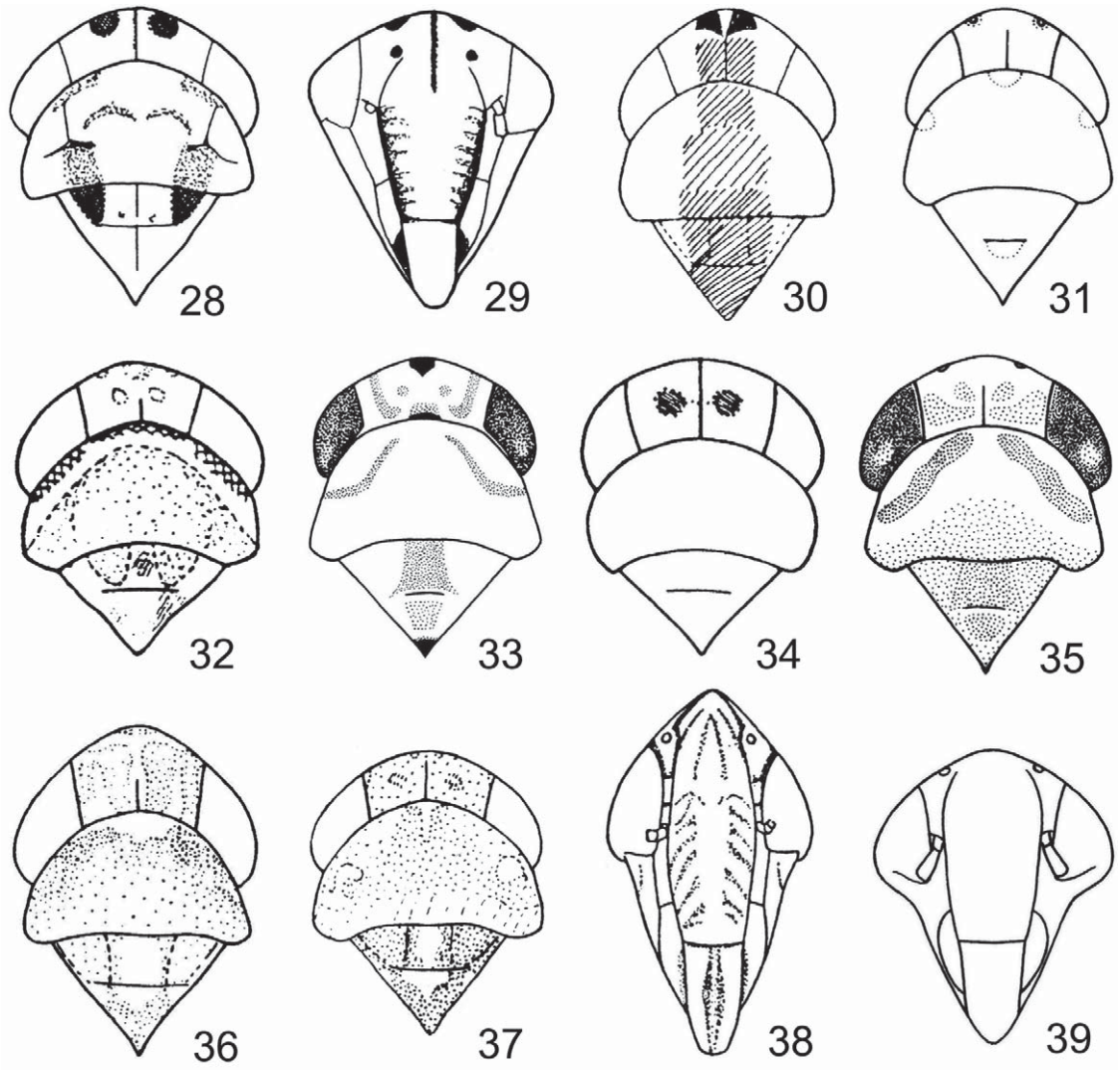

Figs. 28-39. 28, 29. *Apheliona maculosa* (Distant) (after Dworakowska, 1994b); 30. *Alebroides gallus* Dworakowska(after Dworakowska, 1994c); 31. *Nikkotettix cuspidata* Qin & Zhang; 32. *Ghauriana pecularia* Thapa (after Thapa, 1985); 33. *Ishiharella dentata* Qin & Zhang; 34. *Dialecticoptery* (*Akotettix*) *akonis* (Matsumura) (after Dworakowska, 1974); 35.*Velu furcatum* Zhang & Qin; 36. *Faiga dropia* Dworakowska (after Dworakowska, 1980); 37. *Kybos limpida* Wagn. (after Dworakowska, 1976); 38. *Helionides exsultans* (McAtee) (after Dworakowska, 1981a); 39. *Empoasca* (*Distantasca*) *paraterminalis* Qin & Zhang. 28, 30-37: head and thorax, dorsal view; 29, 38, 39: face.

9. Vertex about twice as long as basal width between eyes; anal tube appendage branched apically (Figs. 43, 108) . . . . . .*Alafrasca* Lu & Qin

—. Vertex about as long as basal width between eyes; anal tube appendage unbranched apically (Figs. 44, 109) . . . . . *Lumicella* Lu & Qin

10. Aedeagus hook-shaped in profile and without preatrium (Fig. 90) . . . . . *Schizandrasca* Anufriev

—. Aedeagus not hook-shaped in profile and with preatrium (Figs. 91, 126-128) 11

11. Anal tube appendage extended caudad (Figs. 45, 110); setal group C arranged in 2 rows near base and subapically, but uniseriate medially (Fig. 62); abdominal apodemes not reaching end of segment 3 . . . . . .*Circinans* Qin & Lu

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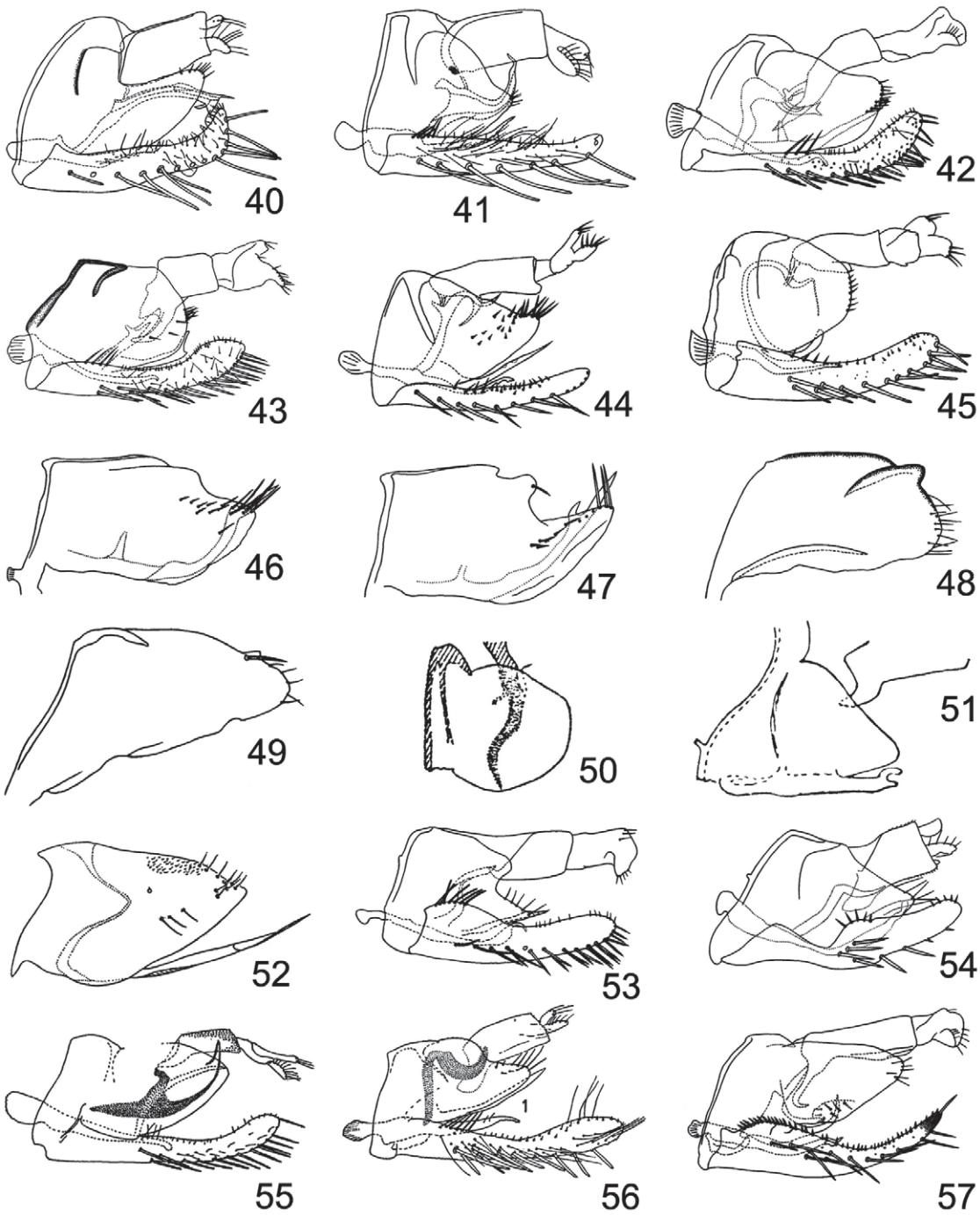

Figs. 40-57. 40. *Membranacea spinata* Qin & Zhang; 41. *Alebrasca actinidiae* Hayashi & Okada; 42. *Alebroides parafuscus* Qin & Zhang; 43. *Alafrasca sticta* Lu & Qin; 44. *Lumicella rotundata* Lu & Qin; 45. *Circinans striata* Qin & Lu; 46. *Baguoidea yunnanensis* Qin & Zhang; 47. *Dayus lii* Qin & Zhang; 48. *Homa sinensis* Qin & Zhang; 49. *Goifa tangailensis* (Ahmed & Samad); 50. *Chlorita* (*Eremochlorita*) *krotka* Dworakowska (after Dworakowska, 1981b); 51. *Jacobiasca formosana* (Paoli) (after Dworakowska, 1984); 52.*Amrasca splendens* Ghauri (after Ghauri, 1967); 53. *Sikkimasca annulata* Dworakowska; 54.*Faiga dropia* Dworakowska; 55. *Heliona constricta* Melichar (after Dworakowska, 1994a); 56. *Helionides exsultans* (McAtee) (after Dworakowska, 1981a); 57. *Empoasca* (*Okubasca*) *dianella* Qin & Zhang. 40-45, 53-57. male genitalia, left lateral view; 46-52. male pygofer, left lateral view.

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—. Anal tube appendage extended ventroanteriorly (Figs. 118, 123, 134); setal group C uniseriate throughout length of plate (Figs. 118, 123, 131); abdominal apodemes reaching anterior margin of segment 5 (Fig. 120) . . . . . *Keumiata* Qin & Dietrich **gen. nov.**

12. Abdominal apodemes weakly developed, not reaching middle of 3rd segment (Fig. 78) . . . . . *Luodianasca* Qin & Zhang

—. Abdominal apodemes well developed, reaching 5th or 6th segment (Figs. 79, 80) 13

13. Aedeagus shaft longer than preatrium; basoventrally bearing one or paired appendage(s) (Fig. 92); anal tube appendage smooth, without denticuli apically (Fig. 111). . . . . *Nikkotettix* Matsumura

—. Aedeagus shaft distinctly shorter than preatrium; basoventrally not bearing appendage (Fig. 93); anal tube appendage denticulate apically (Fig. 112) . . . . . *Ghauriana* Thapa

14. Subgenital plates fused basally (Figs. 63, 64). 15

—. Subgenital plates separate (Figs. 65-77). 16

15. Coronal suture absent (Fig. 33) . . . . . .*Ishiharella* Dworakowska

—. Coronal suture present (Fig. 34) . . . . . .*Dialecticopteryx* Kirkaldy

16. Connective fused with base of aedeagus (Figs. 94-100) 17

—. Connective not fused with base of aedeagus (Figs. 101, 102). 23

17. Forewing with all apical veins arising from m cell (Figs. 12-15). 18

—. Forewing with apical veins MP”+CuA’ and MP’ arising from m cell, RP from r cell (Figs. 16-18) . . . 21

18. Ventral pygofer appendage present (Figs. 46, 47). 19

—. Ventral pygofer appendage absent (Figs. 48, 49) 20

19. Subgenital plate with C-group setae multiseriate and densely grouped apically (Fig. 65) . . . . . *Baguoidea* Mahmood

—. Subgenital plate with C-group setae uniseriate and sparse apically (Fig. 66) . . . *Dayus* Mahmood

20 Forewing with veins RP and MP’ separate and connected by crossvein preapically (Fig. 14); abdominal apodemes weakly developed, tips not divergent posteriorly (Fig. 81). . . . . *Homa* Distant

—. Forewing with veins RP and MP’ confluent preapically (Fig. 15); abdominal apodemes well developed, tips widely divergent posteriorly (Fig. 82). . . . . *Goifa* Dworakowska

21. Transverse veins in forewing not situated at same level (Fig. 16); subgenital plate distinctly long and narrow (Fig. 67). . . . . .*Treufalka* Qin & Zhang

—. Transverse veins in forewing situated at almost same level (Figs. 17, 18); subgenital plate rather broad at base narrowing apicad (Fig. 68) 22

22. Aedeagus with processes (Fig. 99). . . . . *Usharia* Dworakowska

—. Aedeagus without processes (Fig. 100) . . . . . .*Ifugoa* Dworakowska & Pawar

23. Forewing with all apical veins arising from longitudinal m cell (Figs. 19-21) 24

—. Forewing not as above (Figs. 22-27) 27

24. Subgenital plate with A-group setae absent, C-group setae uniseriate (Figs. 69, 70) 25

—. Subgenital plate with A-group setae present, C-group setae arranged in 2 rows at least subbasally (Fig. 71) 26

25. Pronotum antero-laterally with oblique transverse depression on each side (Fig. 35); hind wing with aa cell normal (Fig. 6); paramere semicircular apically (Fig. 104) . . . . . *Velu* Ghauri

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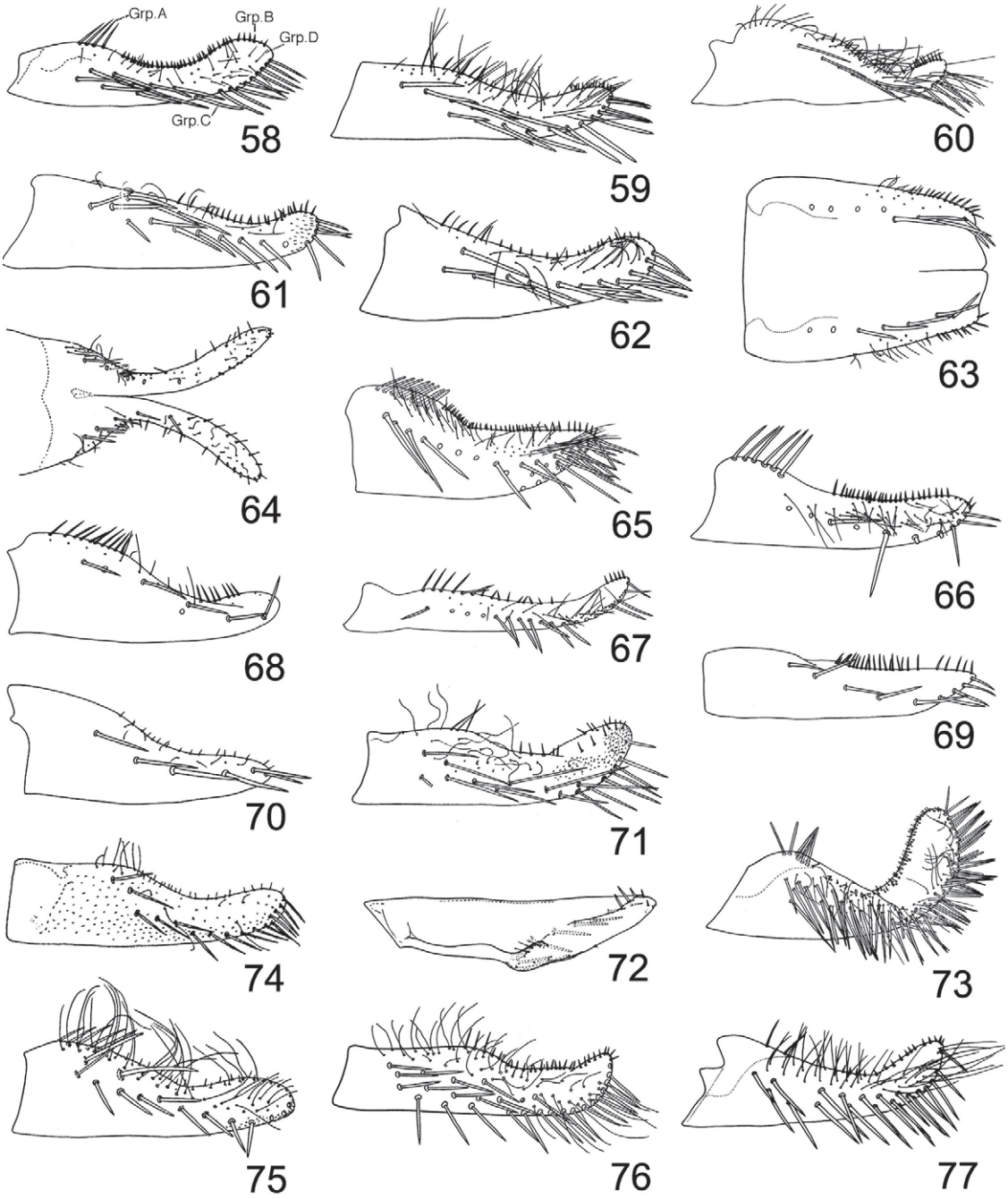

Figs. 58-77. 58. *Alafrasca sticta* Lu & Qin; 59. *Schizandrasca ussurica* (Vilbaste); 60. *Luodianasca recurvata* Qin & Zhang; 61. *Nikkotettix cuspidata* Qin & Zhang; 62. *Circinans striata* Qin & Lu; 63. *Ishiharella hastata* Qin & Zhang; 64. *Dialecticoptery* (*Akotettix*) *akonis* (Matsumura) (after Dworakowska, 1974); 65.*Baguoidea yunnanensis* Qin & Zhang; 66. *Dayus membranaceus* Qin & Zhang; 67. *Treufalka lamellata* Qin & Zhang; 68. *Ifugoa mikra* Dworakowska & Pawar; 69. *Velu furcatum* Zhang & Qin; 70. *Radicafurcus breviprocessus* Qin & Zhang; 71. *Austroasca sagittata* (Jacobi) (after Dworakowska, 1971); 72. *Faiga dropia* Dworakowska (after Dworakowska, 1980); 73. *Kybos smaragdula* (Fall.)(after Dworakowska, 1976); 74. *Heliona constricta* Melichar (after Dworakowska, 1994a); 75. *Helionides exsultans* (McAtee) (after Dworakowska, 1981a); 76. *Asymmetrasca dahaituoensis* Liu & Zhang; 77. *Empoasca* (*Matsumurasca*) *clypealata* Qin & Zhang. 58-77. subgenital plate.

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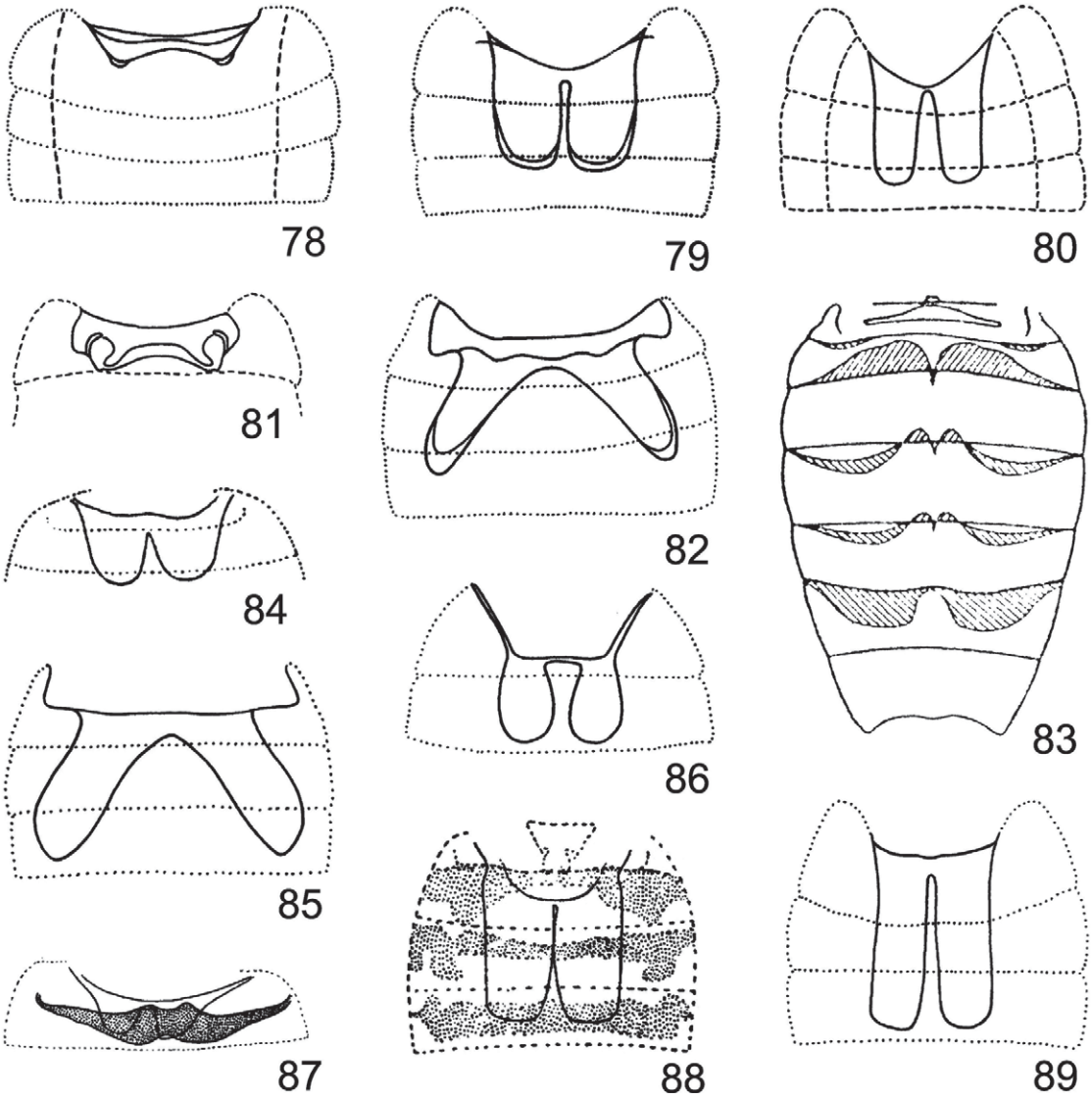

Figs. 78-89. 78. *Luodianasca recurvata* Qin & Zhang; 79. *Nikkotettix taibaiensis* Qin & Zhang; 80. *Ghauriana sinensis* Qin & Zhang; 81. *Homa sinensis* Qin & Zhang; 82. *Goifa tangailensis* (Ahmed & Samad); 83. *Kyboasca zachvatkini* Anufriev (after Anufriev, 1979); 84. *Austrasca soembawaica* Dworakowska (after Dworakowska, 1970b); 85. *Sikkimasca annulata* Dworakowska; 86. *Faiga dropia* Dworakowska; 87. *Kybos betulicola* Wagn. (after Dworakowska, 1976); 88. *Helionides exsultans* (McAtee) (after Dworakowska, 1981a); 89. *Empoasca* (*Distantasca*) *serratipenis* Qin & Zhang. 78-89. abdominal apodemes.

—. Pronotum antero-laterally without depression on each side; hind wing with aa cell very small (Fig. 7); paramere curved but not semicircular apically (Fig. 105) . . . . . .*Radicafurcus* Qin & Zhang

26. Forewing with small blackish spot at apex of cu cell (Fig. 20); abdominal apodemes well developed on most tergites (Fig. 83) . . . . . *Kyboasca* Zachvatkin

—. Forewing without small blackish spot at apex of cu cell (Fig. 21); abdominal apodemes not well developed or developed only on basal segment (Figs. 84). . . . . *Austroasca* Lower

27. Male pygofer without ventral appendage (Fig. 50). . . . . *Chlorita* Fieber

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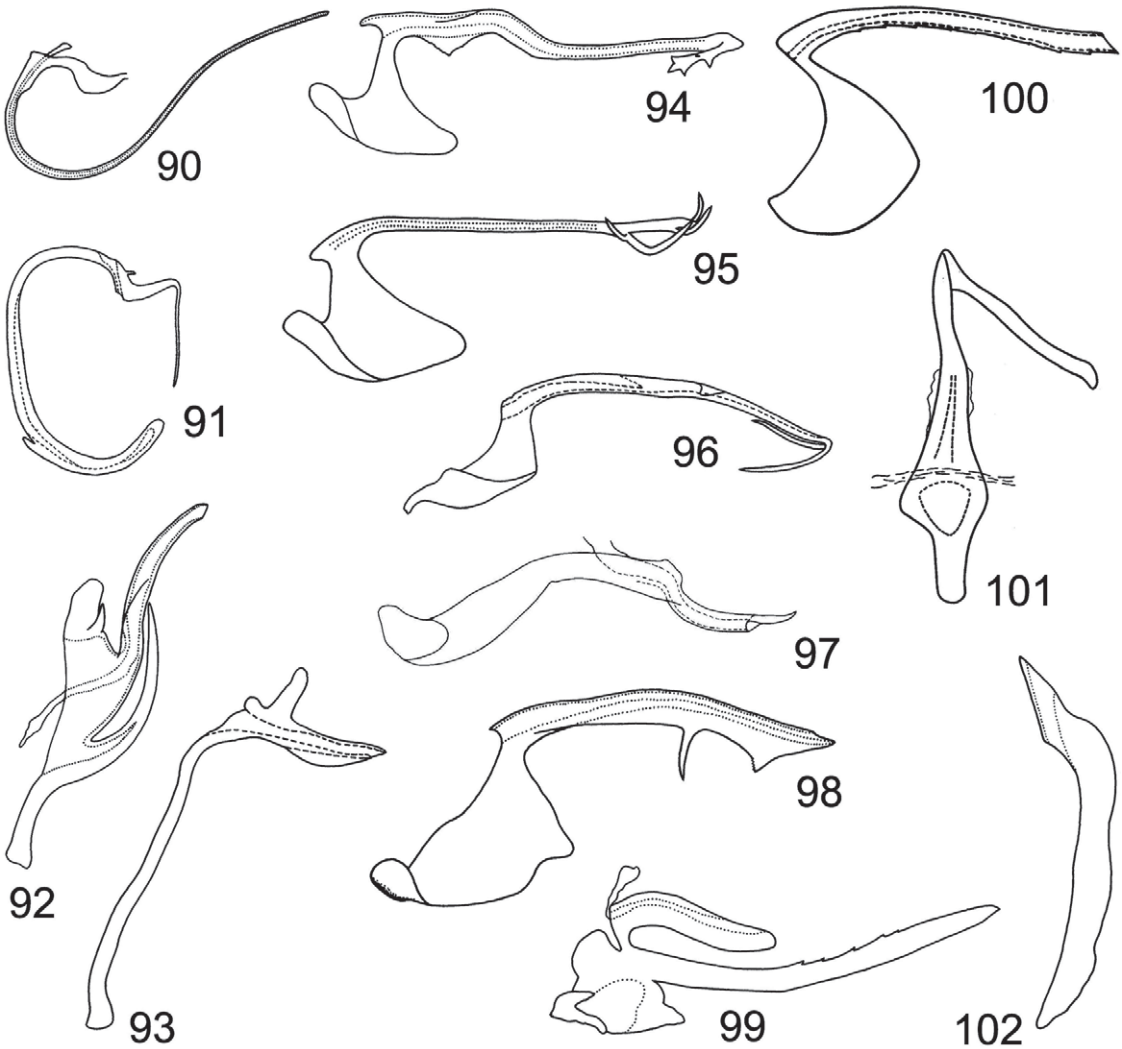

Figs. 90-102. 90. *Schizandrasca ussurica* (Vilbaste); 91. *Circinans striata* Qin & Lu; 92. *Nikkotettix cuspidata* Qin & Zhang; 93. *Ghauriana sinensis* Qin & Zhang; 94. *Baguoidea yunnanensis* Qin & Zhang; 95. *Dayus lii* Qin & Zhang; 96. *Homa sinensis* Qin & Zhang; 97. *Goifa tangailensis* (Ahmed & Samad); 98. *Treufalka lamellata* Qin & Zhang; 99. *Usharia constricta* Zhang & Qin; 100. *Ifugoa media* Dworakowska; 101. *Asymmetrasca dahaituoensis* Liu & Zhang; 102. *Empoasca* (*Matsumurasca*) *clypealata* Qin & Zhang. 90-100, 102. aedeagus, left lateral view; 101. aedeagus, ventral view.

—. Male pygofer with ventral appendage (Figs. 51-57) 28

28. Forewing with vein MP' arising from m cell (Figs. 22, 23) 29

—. Forewing with vein MP' arising from r cell (Figs. 24-27) 30

29. Paramere apophysis strongly curved in apical part (Fig. 106); ventral pygofer appendage branched at tip (Fig. 51) . . . . . *Jacobiasca* Dworakowska

—. Paramere apophysis slightly curved in apical part (Fig. 107); ventral pygofer appendage unbranched at tip (Fig. 52) . . . . . *Amrasca* Ghauri

30. Tips of abdodminal apodemes widely divergent posteriorly (Fig. 85); posterodorsal margin of male pygofer lobe distinctly emarginated (Fig. 53) . . . . . *Sikkimasca* Dworakowska

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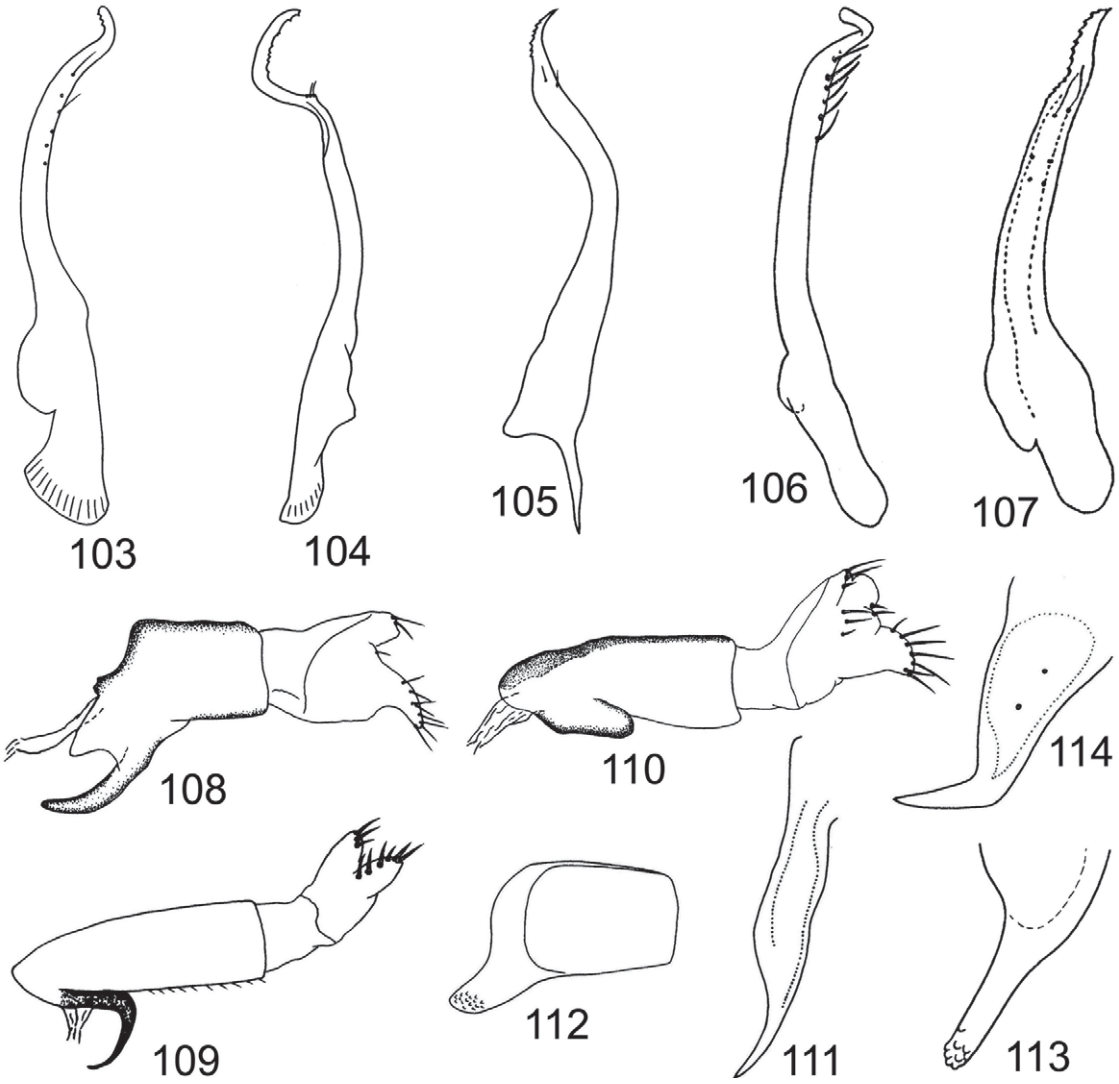

Figs. 103-114. 103. *Alebroides muzitaneus* Qin & Zhang; 104.*Velu furcatum* Zhang & Qin; 105. *Radicafurcus breviprocessus* Qin & Zhang; 106. *Jacobiasca boninensis* (Matsumura) (after Dworakowska, 1972); 107. *Amrasca splendens* Ghauri (after Dworakowska, 1994a). 108. *Alafrasca sticta* Lu & Qin; 109. *Lumicella rotundata* Lu & Qin; 110. *Circinans striata* Qin & Lu; 111. *Nikkotettix cuspidata* Qin & Zhang; 112. *Ghauriana sinensis* Qin & Zhang; 113. *Asymmetrasca dahaituoensis* Liu & Zhang; 114. *Empoasca* (*Distantasca*) *serratipenis* Qin & Zhang. 103-107. paramere. 108-110. anal tube and anal styli, left lateral view; 111-114. anal tube appendage.

—. Tips of abdodminal apodemes not divergent posteriorly (Figs. 86-89); posterodorsal margin of male pygofer not emarginated (Figs. 54-57). 31

31. Subgenital plate spoon-shaped or twisted laterad apically (Figs. 72, 73) 32

—. Subgenital plate not as above (Figs. 74-77). 33

32. Body delicate; crown produced anteriorly, anterior and posterior margins unparallel (Fig. 36); abdomen with one pair of apodemes (Fig. 86); subgenital plate spoon-shaped (Fig. 72) . . . . . *Faiga* Dworakowska

—. Body robust; crown rounded anteriorly, anterior and posterior margins parallel (Fig. 37); abdomen

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with 2 pairs of apodemes (Fig. 87); subgenital plate with apex twisted laterad (Fig. 73) . . . . . *Kybos* Fieber

33. Subgenital plate with A-group setae hairlike distally (Fig. 74); base of ventral pygofer appendage usually shifted caudad (Fig. 55). . . . . *Heliona* Melichar

—. Subgenital plate with A-group setae absent, if present, then not hairlike distally (Figs. 75-77); base of ventral pygofer appendage usually normal (Figs. 56, 57) 34

34. Body usually with distinct markings; face usually more than 1.5 times longer than maximum width (Fig. 38); forewing with veins MP"+CuA' and MP' sinuate (Fig. 26); hind wing with area enclosed by anal veins quite short (Fig. 8) . . . . . *Helionides* Matsumura

—. Body usually yellow or green with no distinct markings, but occasionally marked with red, orange, blue, or white; face usually less than 1.5 times longer than maximum width (Fig. 39); forewing with veins MP"+CuA' and MP' and hind wing with the area enclosed by anal veins normal (Figs. 9, 27) 35

35. Subgenital plate lacking angulate basolateral projection, A-group setae arising far from the base (Fig. 76); anal tube appendage usually with small apical denticuli (Fig. 113); aedeagal shaft usually much longer than the preatrium and a single long asymmetrical process arising at the apex and extended basolaterad (Fig. 101) . . . . . *Asymmetrasca* Dlabola

—. Subgenital plate with angulate basolateral process, A-group setae arising near the base (Fig. 77); anal tube appendage simple (Fig. 114); aedeagal shaft much shorter than preatrium and lacking asymmetrical apical process (Fig. 102) . . . . . *Empoasca* Walsh

KEUMIATA QIN & DIETRICH **GEN. NOV.**

Type species: *Keumiata orientalis* Qin & Dietrich **sp. nov.** here designated.

Description. Body small. Head including eyes broader than pronotum in dorsal view (Fig. 115). Crown rounded anteriorly, length slightly shorter than width between eyes, anterior and posterior margins almost parallel, coronal suture distinct, not attaining anterior margin of crown (Fig. 115), transition of crown to face rounded in profile (Fig. 117). Ocelli present (Figs. 115-117). Face broad and convex in profile, anteclypeus narrow and weakly convex (Figs. 116 and 117). Pronotum large (Fig. 115). Forewing narrow, rounded apically, apical cells occupying about one-third of total length, 3rd cell triangular, veins RP, MP' arise from r cell and MP"+CuA' from m cell, c and r cells nearly equal in width, both narrower than m and cua cells, 2nd apical cell with margins subparallel at base but apparently broadened apicad (Fig. 121). Hind wing with CuA branched near apex, cell cua' very small (Fig. 122). Front femur with dorsoapical pair of macrosetae, AM1 enlarged and situated on ventral margin, intercalary row with 1 large basal setae and 6 smaller setae more distad. Hind femur macrosetae 2+1+1, tibia row AV with 7 macrosetae near apex.

Male basal abdominal apodemes developed, parallel sided (Figs. 120). Male pygofer elongate, terminally bearing rigid microsetae on each side of lobe, ventral appendage absent (Figs. 118, 123-125), dorsal bridge long (Figs. 119 and 124). Subgenital plate extended well beyond pygofer side, all setal groups present, A-group setae arising near base of plate, B-group setae scattered along dorsal margin, C-group setae large, arranged in a single row, D-group setae sparse and short (Figs. 118, 123, 131, 132). Paramere slim, apophysis bearing prominent dentifer and a few slender setae in apical half (Figs. 118, 123, 133). Connective lamellate (Fig. 130). Aedeagal shaft tubular, preatrium and dorsoatrium differentiated into lamellate structure bearing long asymmetrical process ventro-basally, adjacent to shaft with another process arising from lamella on left side (Figs. 118, 123, 126-128). Anal tube appendage broad and curved (Figs. 118, 123, 134).

Remarks

Keumiata is similar to *Alebrasca* Hayashi & Okada, *Luodianasca* Qin & Zhang, *Membranacea* Qin & Zhang, *Nikkotettix* Matsumura, *Schizandrasca* Anufriev, *Szara* Dworakowska and *Flaviata* **gen. nov.** in having forewing veins MP' and RP arising from the r cell, in having hind wing CuA branched and in the absence of a male ventral pygofer appendage (present or absent in *Nikkotettix*). However, the new genus differs from *Luodianasca*, *Nikkotettix*, *Szara* and *Flaviata* in having A-group setae on the plate (A-group undifferentiated in these 4 genera), from *Alebrasca* and *Membranacea* in having an anal tube appendage, from *Schizandrasca* in having subgenital plate C-group setae arranged in one row medially (C-group setae arranged in 2 rows medially in *Schizandrasca*). The new genus also dif-

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fers from *Luodianasca*, *Membranacea*, *Schizandrasca* and *Flaviata* in having the aedeagus with a dorsoatrium, from *Luodianasca* in having the abdominal apodemes well developed (vestigal in *Luodianasca*), and from *Membranacea* in having the male pygofer dorsal margin lacking a dorsocaudal emargination. *Keumiata* also differs from *Flaviata* in having vein CuA" in the hind wing emerging apicad of joining MP" and cell cua' fairly small (CuA in hind wing emerging basad of joining MP" and cell cua' large in *Flaviata*).

Etymology

The generic name is an arbitrary combination of letters, and is regarded as feminine.

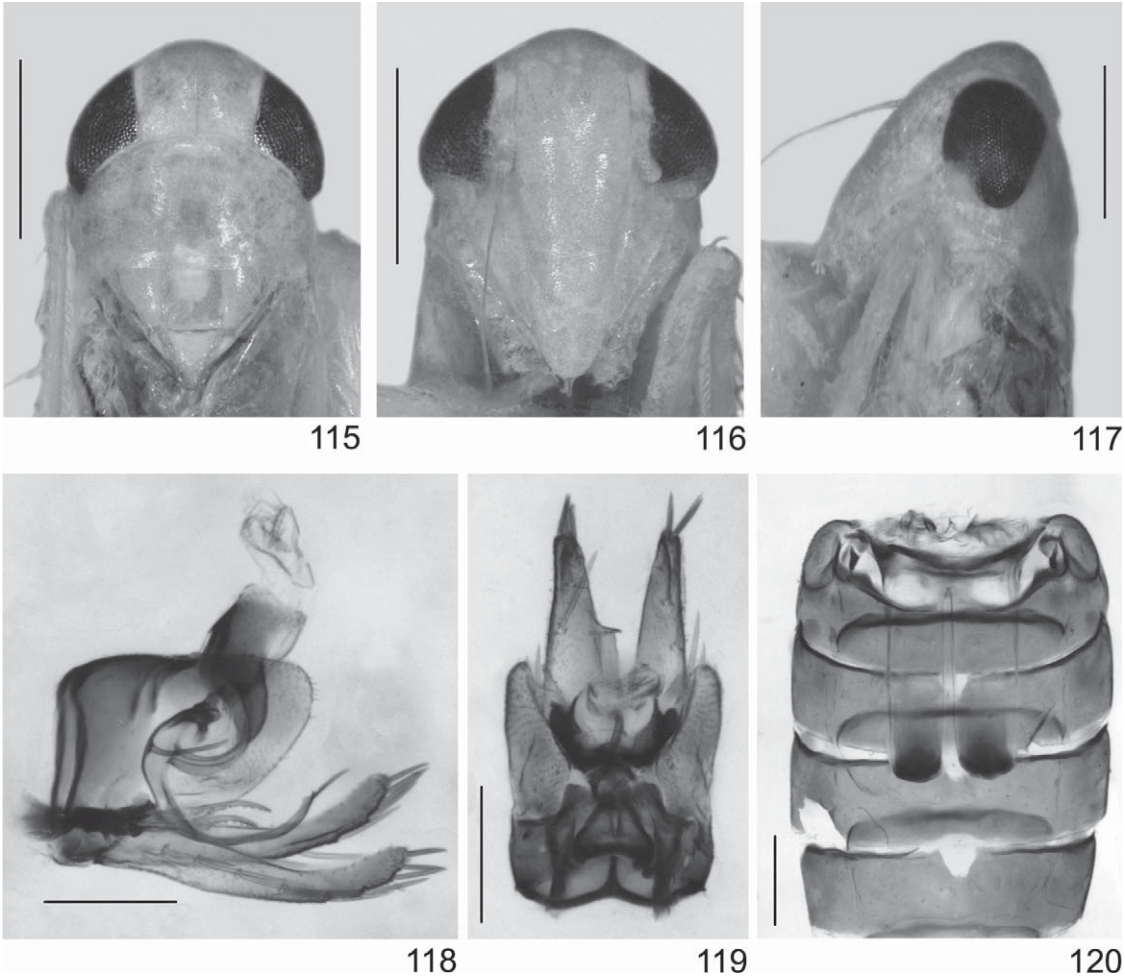
Distribution

China (Yunnan Prov.), Thailand.

KEUMIATA ORIENTALIS QIN & DIETRICH **SP. NOV.**
(Figs. 115-134)

Description. Size. Male 3.1-3.5 mm.

Color. General color (holotype) yellow, crown centrally with beige depression on each side of coronal suture, adjacent to eyes with longitudinal, narrow and whitish stripes laterally, anteriorly with orange patch extending to the base of face, anteclypeus and genae pale yellow. Eyes dark. Ocelli grayish. Center of mesonotum with quadrate yellow patch anteriorly, scutellum with median triangular yellow patch and pair of smaller marginal patches, scutoscutellar sulcus black brown. Forewing and hind wing subhyaline, veins of hind wing brownish. Legs yellowish. Specimen from Thailand (Paratype) tan yellowish in general color, with median depression on each side of coronal suture grayish yellow.Eyes greyish black.



Figs. 115-120. *Keumiata orientalis* Qin & Dietrich **sp. nov.** 115. head and thorax, dorsal view; 116. face; 117. head and thorax, left lateral view; 118. male genitalia, left lateral view; 119. male genitalia, dorsal view; 120. abdominal apodemes. Scale bars = 0.5 mm (Figs. 115-117); 0.2 mm (Figs. 118-120).

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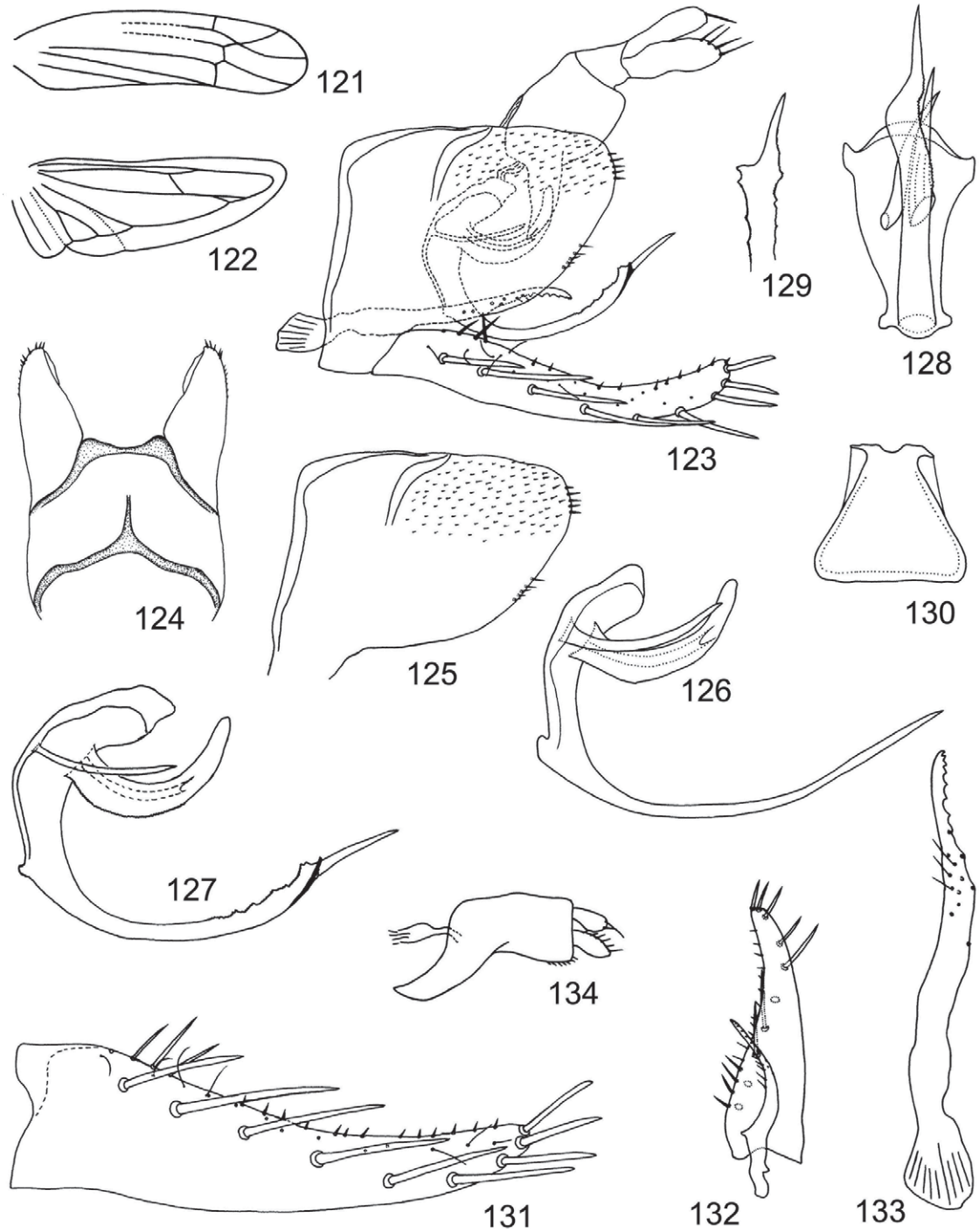

Figs. 121-134. *Keumiata orientalis* Qin & Dietrich **sp. nov.** 121. forewing; 122. hind wing; 123. male genitalia, left lateral view; 124. male pygofer, dorsal view; 125. male pygofer, left lateral view; 126. aedeagus, left lateral view (NWAFU); 127. aedeagus, left lateral view (INHS); 128. aedeagus, ventral view (NWAFU); 129. apex of ventrao-basal process of aedeagus, ventral view (INHS); 130. connective; 131. subgenital plate; 132. subgenital plate and paramere, dorsal view; 133. paramere; 134. anal tube and anal styli, left lateral view.

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Male Genitalia. Basal abdominal apodemes surpassing anterior margin of segment 5 (Fig. 120). Male pygofer strongly narrowing in caudal part, bearing 2 separate groups of rigid microsetae, one group (about 6 setae) at apex of lobe, another (about 4-6 setae) close to caudo-ventral margin originating on inner surface, outer surface of the lobe with well developed sensilla field in upper half (Figs. 118, 123, 125), dorsal bridge nearly half total length of pygofer (Figs. 119, 124). Subgenital plate broad at base, gradually narrowing to apex, distal 1/4 slightly curved dorsad, A-group setae (4-5) rigid, B-group setae (11-13) small, roughly uniseriate and scattered along dorsal margin in apical 1/2-3/5, C-group setae (9-11) arising near base of plate, reaching apex, D-group setae starting basad of C-group macrosetae in 2 irregular rows (Figs. 118, 123, 131). Paramere sinuate, bearing about 11 distinct teeth, about 5 fine setae and few sensory pits in apical half (Figs. 118, 123, 133). Aedeagal shaft flat in profile, apical 2/3 curved and gradually narrowing, gonopore subapical on the left side, ventro-basal protrusion of aedeagus much longer than shaft, broad at base, apical half slightly curved dorsad, in ventral aspect apex sinuate and strongly narrowing, slender process adjacent to shaft on left side shorter than shaft (Figs. 118, 123, 126, 128); specimen from Thailand with shaft adorned with numerous tiny teeth ventrally in basal 3/5, ventro-basal protrusion of the aedeagus serrated dorsally and produced ventrally near apex (Figs. 127, 129). Connective trapezoidal, caudal margin emarginate medially (Fig. 130). Anal tube appendage well developed, curved ventroanteriorly and gradually narrowing (Figs. 118, 123, 134).

Female

Unknown.

Host plant

Unknown.

Type Material

HOLOTYPE. male (NWAFU), CHINA: Yunnan, Mengyang, Sanchahe, 7-VI-1991, 800 m, coll. Rungang Tian, Wanzhi Cai, Yinglun Wang, by light trap. PARATYPE. 1 male (INHS), THAILAND: Chiang Mai, Doi Phahompok NP Headquarter N 19° 57.961′ E 9° 99.355′, 21-28-II-2008, 569 m, by Malaise trap.

Etymology

The specific epithet refers to the distribution of the type specimens (in Oriental Region).

Distribution

China (Yunnan Prov.), Thailand.

Remarks

The differences in the structure of the aedeagus between the two specimens available for study are here considered to represent intraspecific variation. Additional specimens need to be studied in order to determine the extent of variation among and within populations.

Flaviata Lu & Qin **gen. nov.**

Type species: *Flaviata variata* Lu & Qin **sp. nov.** here designated.

Description. Body robust, cylindrical. Head including eyes broader than pronotum in dorsal view (Figs. 135, 137). Crown short, rounded anteriorly, middle length prominently shorter than width between eyes, anterior and posterior margins parallel, coronal suture distinct, not extending to anterior margin (Figs. 135, 137), transition to face rounded in profile (Fig. 136); ocelli present (Figs. 135-138). Face broad and distinctly convex in profile, anteclypeus strongly convex and broad (Figs. 136, 138). Pronotum large (Figs. 135, 137). Forewing narrow, rounded apically, apical cells occupying more than one-third of total length, all quadrate at base, veins RP, MP' arise from r cell and MP"+CuA' from m cell, c and r cells nearly equal in width, narrower than m and cua cells, 2nd apical cell with margins subparallel, slightly broadened at apex (Fig. 142). Hind wing with bifurcation point of CuA basad of coalescence of CuA with MP", cell cua' fairly big (Fig. 143). Front femur with dorsoapical pair of macrosetae, AM1 enlarged and situated on ventral margin, intercalary row with 2 large basal setae and 8 smaller setae more distad. Hind femur macrosetae 2+1+1, row AV with 9 macrosetae near apex.

Male basal abdominal apodemes developed (Fig. 141). Male pygofer strongly sclerotized dorsally and terminating in acuminate process surpassing end of lobe, caudo-ventral margin bearing rigid microsetae, ventral appendage absent, dorsal bridge short (Figs. 139, 140, 144-148). Subgenital plate far exceeding pygofer side, A-group setae absent, B-group setae rigid, C-group setae in single row, sometimes biseriate at basal fourth and near middle, reaching apex of plate, D-group setae numerous, elongate (Figs. 139, 140, 144, 145, 152). Paramere robust, apically curved, without teeth but with few fine setae and sensory pits near middle (Figs. 139, 144, 145, 154). Connective trapezoidal (Fig. 151). Aedeagal shaft tubular, dorso-basally with broad lamella extended to base of anal tube, dorsoatrium absent, preatrium short (Figs. 139, 144, 145, 149, 150). Anal tube membranous, ventro-basally with small process (Figs. 139, 140, 144, 145, 155).

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Remarks

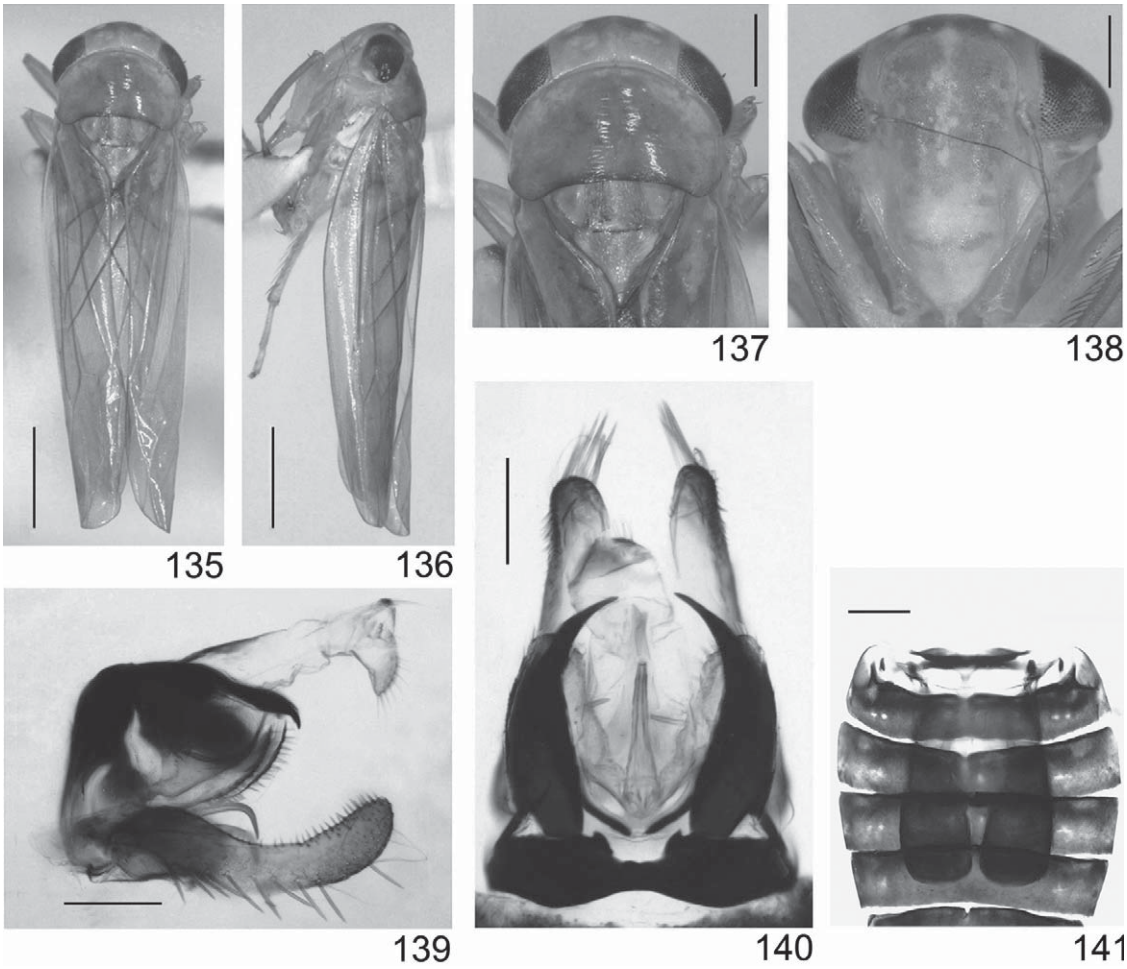
Flaviata is similar to *Alebrasca* Hayashi & Okada, *Luodianasca* Qin & Zhang, *Membranacea* Qin & Zhang, *Nikkotettix* Matsumura, *Schizandrasca* Anufriev, *Szara* Dworakowska and *Keumiata* **gen. nov.** in having forewing veins MP' and RP arising from the r cell, in having hind wing CuA branched and in the absence of a male ventral pygofer appendage (absent or present in *Nikkotettix*). However, the new genus differs from all these genera in having the bifurcation point of CuA in the hind wing basad of the coalescence of CuA with MP" and the male pygofer terminated with a process surpassing the end of the lobe. It differs from *Alebrasca*, *Membranacea*, *Schizandrasca* and *Keumiata* in lacking setal group A on the plate, from *Alebrasca* and *Membranacea* in having an anal tube appendage and from *Schizandrasca* in having the aedeagus with a preatrium.

The strongly convex and laterally expanded anteclypeus, when present in Typhlocybinae, usually only occurs in males, with females of the same species having the anteclypeus relatively narrow and flat (Dietrich 2013a). Because females were not available for study it is not possible, at present, to determine whether this feature is sexually dimorphic in *Flaviata*.

Flaviata variata Lu & Qin **sp. nov.**
(Figs. 135-155)

Description. Size. Male 5.0-5.2mm.

Color. General body color orange yellow to tan. Crown with yellow to brownish depression on



Figs. 135-141. *Flaviata variata* Lu & Qin **sp. nov.** 135. male adult (abdomen removed), dorsal view; 136. male adult (abdomen removed), left lateral view; 137. head and thorax, dorsal view; 138. face; 139. male genitalia, left lateral view; 140. male genitalia, dorsal view; 141. abdominal apodemes. Scale bars = 1.0 mm (Figs. 135, 136); 0.4 mm (Figs. 137, 138); 0.2 mm (Figs. 139-141).

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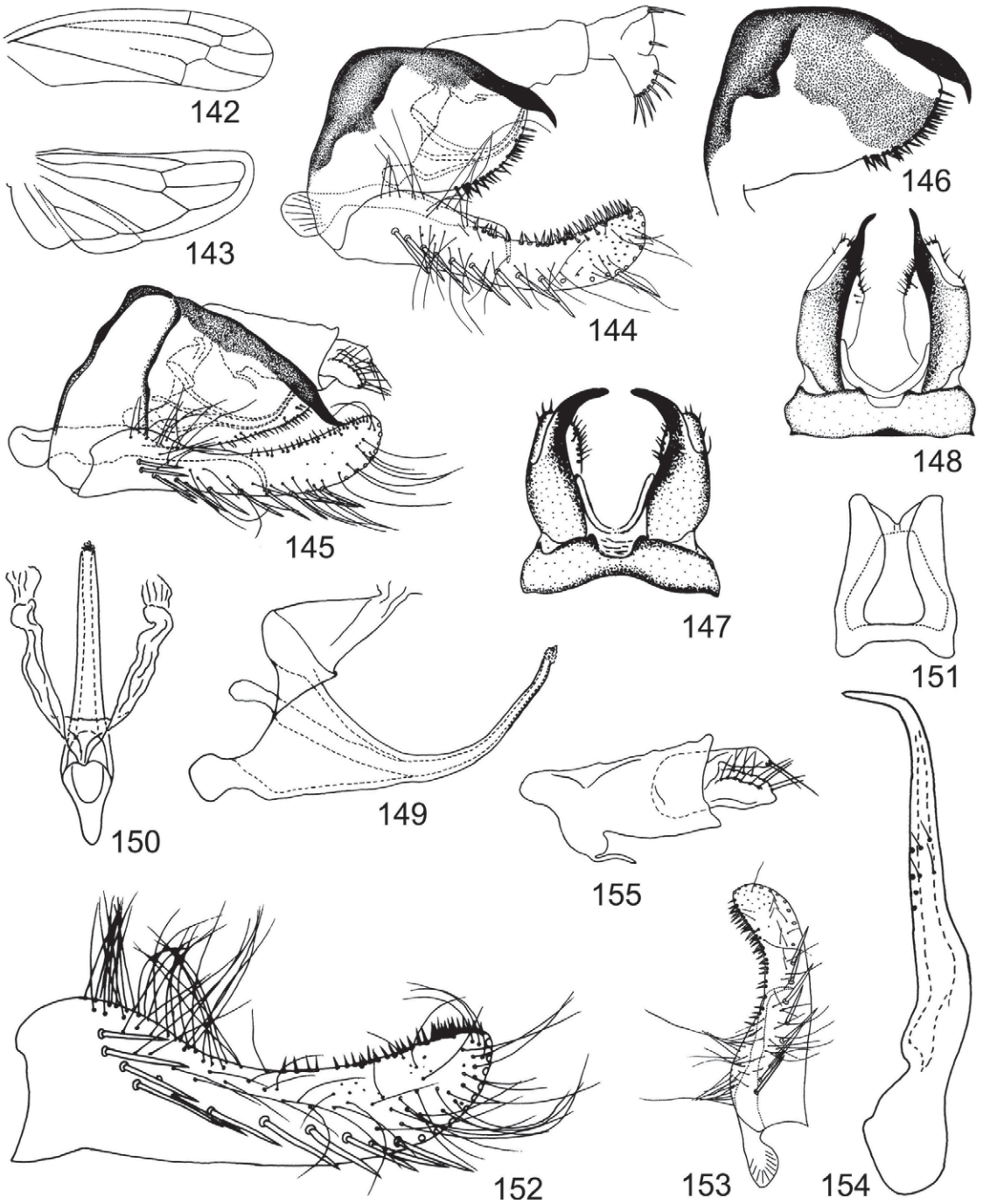

Figs. 142-155. *Flaviata variata* Lu & Qin **sp. nov.** 142. forewing; 143. hind wing; 144, 145. male genitalia, left lateral view; 146, male pygofer, left lateral view; 147, 148. male pygofer, dorsal view; 149. aedeagus, left lateral view;150.aedeagus, dorsal view; 151. connective; 152. subgenital plate; 153. subgenital plate and paramere, ventral view; 154. paramere; 155. anal tube and anal styli, left lateral view.

each side of coronal suture, coronal suture brown. Eyes dark. Ocelli whitish. Face with longitudinal yellowish stripe medially, not reaching end of frontoclypeus, remaining area of face yellow to slightly sordid whitish. Pronotum black along posterior margin. Mesonotum centrally with pair

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of narrow grayish stripes, scutoscutellar sulcus black. Fore- and hind wing subhyaline, veins of hind wing brown. Abdomen black. Legs yellowish.

Basal abdominal apodemes exceeding mid-length of segment 5 (Fig. 141). Male pygofer bearing about 24 rigid microsetae along caudo-ventral margin, terminal process on dorsal side narrowed and curved at apex, in dorsal aspect apices slightly to strongly curved mesad (Figs. 139, 140, 144-148). Subgenital plate broad at base, B-group setae (32-36) occupying nearly half length of dorsal margin, C-group setae (19-21) starting near base and reaching apex of plate, D-group setae long, arranged in 4-6 irregular rows (Figs. 139, 144, 145, 152, 153). Paramere narrowed in caudal part, medially bearing about 4 fine setae and few sensory pits (Figs. 139, 144, 145, 153, 154). Aedeagal shaft broad at base and strongly narrowed in basal half, apical half gradually narrowed and curved dorsad, gonopore apical (Figs. 139, 144, 145, 149, 150). Connective broad, caudal margin deeply emarginate medially (Fig. 151). Anal tube appendage short and slender in profile, curved posteromesad (Figs. 139, 140, 144, 145, 155).

Female: Unknown.

Host plant: Unknown.

Type Material

HOLOTYPE. Male (NWAFU), China, Sichuan, Mt. Emei, 27-VII-2013, coll. Sihan Lu, by light trap. PARATYPES. 1 male (NWAFU), same data as holotype; 2 males (NWAFU), China, Zhejiang, Mt. Tianmu, 26-VII-2011, coll. Lin Lu, by light trap.

Etymology

The specific epithet refers to the varied body color of the type specimens.

Distribution

China (Sichuan, Zhejiang).

Acknowledgments

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