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A taxonomic study of the genus *Eupteryx* Curtis (Hemiptera: Cicadellidae: Typhlocybinae), with description of five new records and one new species from China

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Abstract

A new species, *Eupteryx* (*Stacla*) *gracilirama* **sp. nov.** from China is described and illustrated and five species are recorded for the first time from China: *Eupteryx* (*Stacla*) *janeki* Dworakowska, *Eupteryx* (*Stacla*) *albonigra* Dworakowska, *Eupteryx* (*Stacla*) *hela* Dworakowska, *Eupteryx* (*Stacla*) *irminae* Dworakowska and *Eupteryx* (*sensu stricto*) *stachydearum* (Hardy). A check-list and key to all known species of *Eupteryx* from China are provided.

Key words: Auchenorrhyncha, Typhlocybini, morphology, taxonomy, distribution

Introduction

The leafhopper genus *Eupteryx* was established by Curtis (1829) with *Cicada atropunctaca* Goeze as its type species and includes two subgenera *Eupteryx* and *Stacla* Dworakowska, 1969, with 120 species to date (Mühlethaler & Gnezdilov 2013, Guglielmino 2014, Dmitriev & Dietrich 2003).

Some species of the nominate subgenus *Eupteryx* from India, Sri Lanka and Pakistan were described by Distant (1918), Melicher (1903), Young (1952) and Ahmed (1967, 1969). Dworakowska (1978) confirmed eighty-one known species in the subgenus *Eupteryx* distributed in the Palaearctic, Nearctic, Oriental and Ethiopian Regions, and reviewed forty species of subgenus *Eupteryx* in Asia (Dworakowska, 1982). Later Guglielmino (2011) and Poggi (2012) described two new species of *Eupteryx melissae* group from Italy. Recently, Mühlethaler & Gnezdilov (2013) described two new species from the northern Caucasus and Guglielmino (2014) revised the *Eupteryx aurata* group using morphology, ecology and genetics which included two new species from Italy and showed that the *E. aurata* group is monophyletic. In addition, Dmitriev (2013) proposed a replacement name, *Eupteryx* (*Eupteryx*) *dlabolai,* for the junior homonym *Eupteryx octonotata* Dlabola (not Hardy). In China, Chou & Ma (1981) reported four species of subgenus *Eupteryx* from Shaanxi Province. To date, there are 109 known speceis of subgenus *Eupteryx* worldwide.

Dworakowska (1969) established the subgenus *Stacla* to include three species. Thereafter, Dworakowska (1979, 1982, 1994) described seven species of subgenus *Stacla* in total. Hu & Kuoh (1991) described one new species *Eupteryx pentavittatus* from China and compared it with *Eupteryx* (*Stacla*) *cristagalli* Dworakowska without explicitly placing it the former in that subgenus. Here we treat *Eupteryx pentavittatus* as belonging to the subgenus *Stacla* since it also closely resembles the new species, *Eupteryx* (*Stacla*) *gracilirama,* in the external appearance. Therefore, until now there are 11 known species of subgenus *Stacla*, all restricted to the Oriental Region.

In this paper, thirteen species of the genus *Eupteryx* are reported including one new species and five new records from China. The type specimens of the new species are deposited in the collections of the Entomological Museum, Northwest A&F University, Yangling, China.

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Checklist of *Eupteryx* Curtis from China

Subgenus *Eupteryx* Curtis, 1829
Eupteryx (E.) artemisiae (Kirschbaum, 1868)
Typhlocyba artemisiae Kirschbaum, 1868: 190
Eupteryx abrotani Douglas, 1874: 118
Eupteryx semipunctata Puton, 1875: 146; Puton, 1886: 87
Eupteryx artemisiae Douglas, 1874: 118; Dworakowska, 1970: 362; Chou & Ma, 1981: 199
Distribution. China (Shaanxi), Oriental, Palaearctic, Nearctic, Australian Region.

Eupteryx (E.) undomarginata Lindberg, 1929
Eupteryx undomarginata Lindberg, 1929: 13; Dworakowska, 1970: 363; Anufriev, 1978: 154; Chou & Ma, 1981: 199; Dworakowska, 1982: 171
Distribution. China (Shaanxi), Far East of Russia (Amur region), Mongolia, North Korea.

Eupteryx (E.) seiugata Dlabola, 1967
Eupteryx seiugata Dlabola, 1967: 23; Dworakowska, 1970: 363; Chou & Ma, 1981: 199; Dworakowska, 1982: 171
Distribution. China (Shaanxi), Mongolia.

Eupteryx (E.) minuscula Lindberg, 1929
Eupteryx minuscula Lindberg, 1929: 12; Vilbaste, 1968: 90; Dworakowska, 1970: 363; Anufriev, 1978: 154; Dworakowska, 1982: 170
Eupteryx ussuriensis Vilbaste, 1966: 63
Distribution. China (Jangsu, Shaanxi, Gansu, Hubei, Sichuan), Far East of Russia (Amur region), North Korea, Japan.

Eupteryx (E.) adspersa (Herrich-Schäffer, 1838)
Typhlocyba adspersa H.-S., 1838: 12
Eupteryx gallica Wagner, 1939: 195
Eupteryx adspersa Puton, 1875: 146; Dworakowska, 1970: 362; Dworakowska, 1982: 170; Zhang, 1990: 152
Distribution. China (Shaanxi), Europe, Asia.

Eupteryx (E.) semipunctata (Fieber, 1884)
Typhlocyba semipunctata Fieber, 1884: 95
Eupteryx abrotani: Mitjaev, 1963 nec Douglas, 1874: 118
Eupteryx semipunctata, Dworakowska, 1970: 363; Chou & Ma, 1981: 199; Dworakowska, 1982: 171
Distribution. China (Shaanxi), USSR, Mongolia.

Eupteryx (E.) stachydearum (Hardy, 1850), **rec. nov.**
Typhlocyba stachydearum Hardy, 1850: 122
Eupteryx stachydearum Marshall, 1867: 268; Vilbaste, 1973: 26; Dworakowska, 1982: 174
Eupteryx hortensis Curtis, 1833 nomen oblitum
Distribution. China (Sinkiang), Cyprus, Turkey, Palestine, Iran, USSR.

Subgenus *Stacla* Dworakowska, 1969
Eupteryx (*Stacla*) *pentavittatus* Hu & Kuoh, 1991
Eupteryx (*Stacla) pentavittatus* Hu & Kuoh, 1991: 258
Distribution. China (Yunnan).

Eupteryx (*Stacla*) *janeki* Dworakowska, 1969, **rec. nov.**
Eupteryx (*Stacla*) *janeki* Dworakowska, 1969: 439; Dworakowska, 1982: 176; Dworakowska, 1994: 138
Distribution. China (Yunnan), East Nepal, India (Sikkim).

Eupteryx (*Stacla*) *albonigra* Dworakowska, 1994, **rec. nov.**
Eupteryx (*Stacla*) *albonigra* Dworakowska, 1994: 137
Distribution. China (Yunnan), Nepal (central), India (Sikkim).

Eupteryx (*Stacla*) *hela* Dworakowska, 1982, **rec. nov.**
Eupteryx (*Stacla*) *hela* Dworakowska, 1982: 176
Distribution. China (Yunnan), Nepal.

Eupteryx (*Stacla*) *irminae* Dworakowska, 1969, **rec. nov.**
Eupteryx (*Stacla*) *irminae* Dworakowska, 1969: 440; Dworakowska, 1982: 176; Dworakowska, 1994: 138
Distribution. China (Sichuan, Yunnan), East Nepal, India (Sikkim).

Eupteryx (*Stacla*) *gracilivramus* **sp. nov.**
Distribution. China (Yunnan).

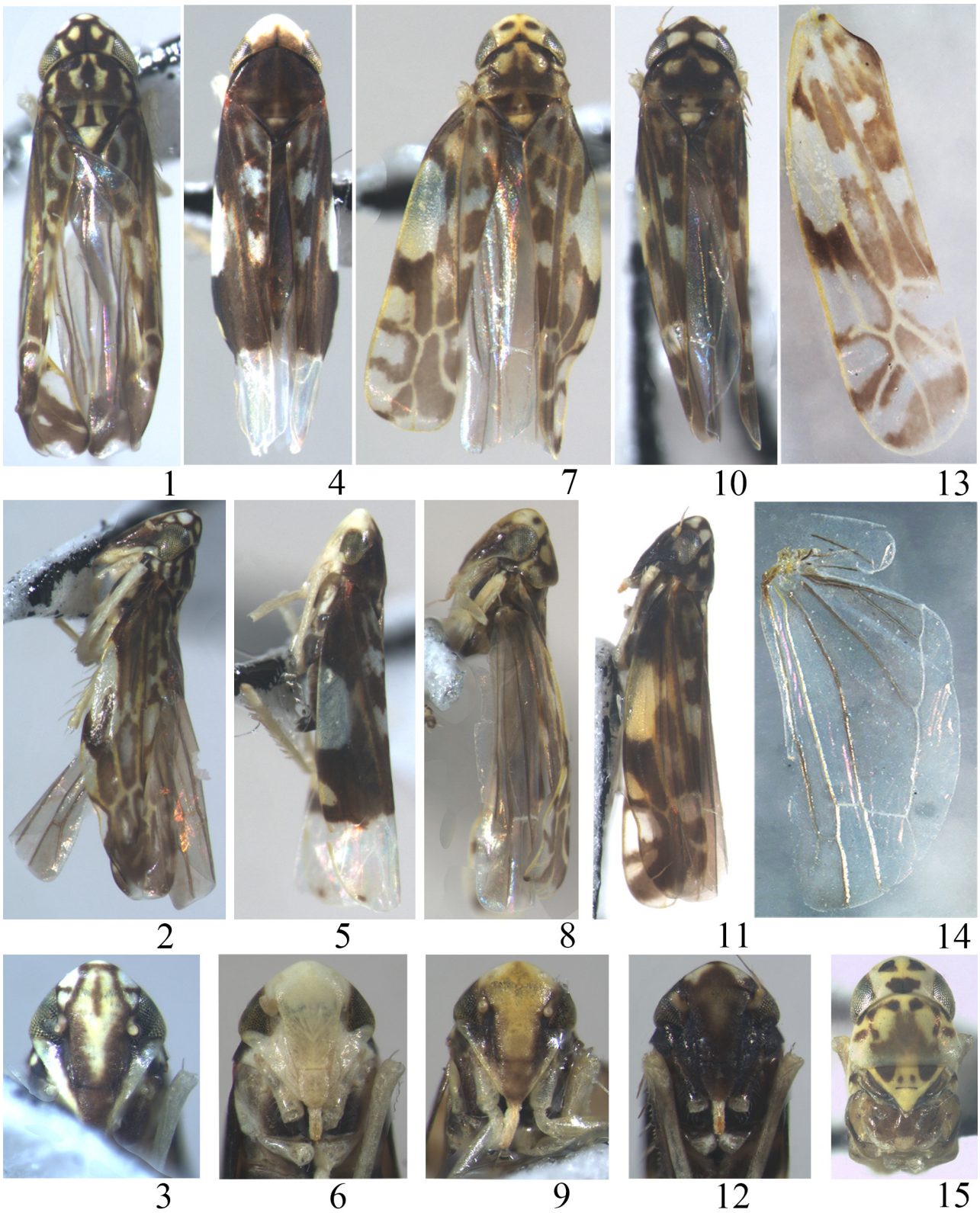
Key to species of *Eupteryx* Curtis from China (males)

1. Pygofer side with various processes at hind margin; basal macroseta on subgenital plate shorter . . . . . *Eupteryx (Eupteryx)* ...2
- Pygofer side without any process at hind margin; basal macroseta on subgenital plate longer . . . . . *Eupteryx (Stacla)* ...8
2. Aedeagal shaft with processes forked apically (Figs 23, 24) . . . . . *E. (E.) stachydearum* rec. nov.
- Aedeagal shaft with processes not forked apically 3
3. Forewing with broad bands; pygofer processes thin; aedeagal shaft with apical processes slender, band-like, curved to base of shaft and crossed subapically . . . . . *E. (E.) minuscula*
- Forewing with small spots; pygofer processes thick; aedeagal shaft with apical processes slim, not band-like 4
4. Aedeagus with apical processes short and not exceeding half of shaft. 5
- Aedeagus with apical processes long and exceeding to or over half of shaft 6
5. Body small, yellowish-white, patches small and light; aedeagus with apical processes extremely slim . . . . . *E. (E.) seiugata*
- Body slender, yellowish-green, patches big and dark; aedeagus with apical processes slender. . . . . *E. (E.) adspersa*
6. Aedeagal shaft with apical processes extending to midlength of shaft. . . . . *E. (E.) artemisiae*
- Aedeagal shaft with apical processes extending basad of shaft midlength. 7
7. Forewing with spots inconspicuous; pygofer processes curved posterodorsad . . . . . *E. (E.) undomarginata*
- Forewing with spots conspicuous; pygofer processes curved anterodorsad. . . . . *E. (E.) semipunctata*
8. Aedeagal shaft with paired processes apically 9
- Aedeagal shaft without any process apically 10
9. Aedeagal shaft with one pair of processes elongate, slender, strongly recurved, and rugose apically (Figs 17, 18) . . . . . *E. (S.) janeki* rec. nov.
- Aedeagal shaft with two pairs of processes, slender S-shaped ventral processes and Y-shaped dorsal processes apically (Figs 40, 41, 42) . . . . . *E. (S.) gracilivramus* **sp.nov.**
10. Aedeagal shaft acute apically in lateral view . . . . . *E. (S.) pentavittatus*
- Aedeagal shaft not acute apically in lateral view 11
11. Forewing mottled with brown and pale markings throughout length; aedeagal shaft inflated apically in lateral view 12
- Forewing with abrupt transition between dark brown basal 2/3 and pale apical 1/3 (Figs 4, 5); aedeagal shaft uninflated apically in lateral view (Figs 21, 22) . . . . . *E. (S.) albonigra* rec. nov.
12. Head and forewing with dark spots adjoined (Figs 10, 11); lateral arms of connective long (Fig. 29) . . *E. (S.) irminae* rec. nov.
- Head and forewing with dark spots separated (Figs 7, 8); lateral arms of connective very short (Fig. 25) . . *E. (S.) hela* rec. nov.

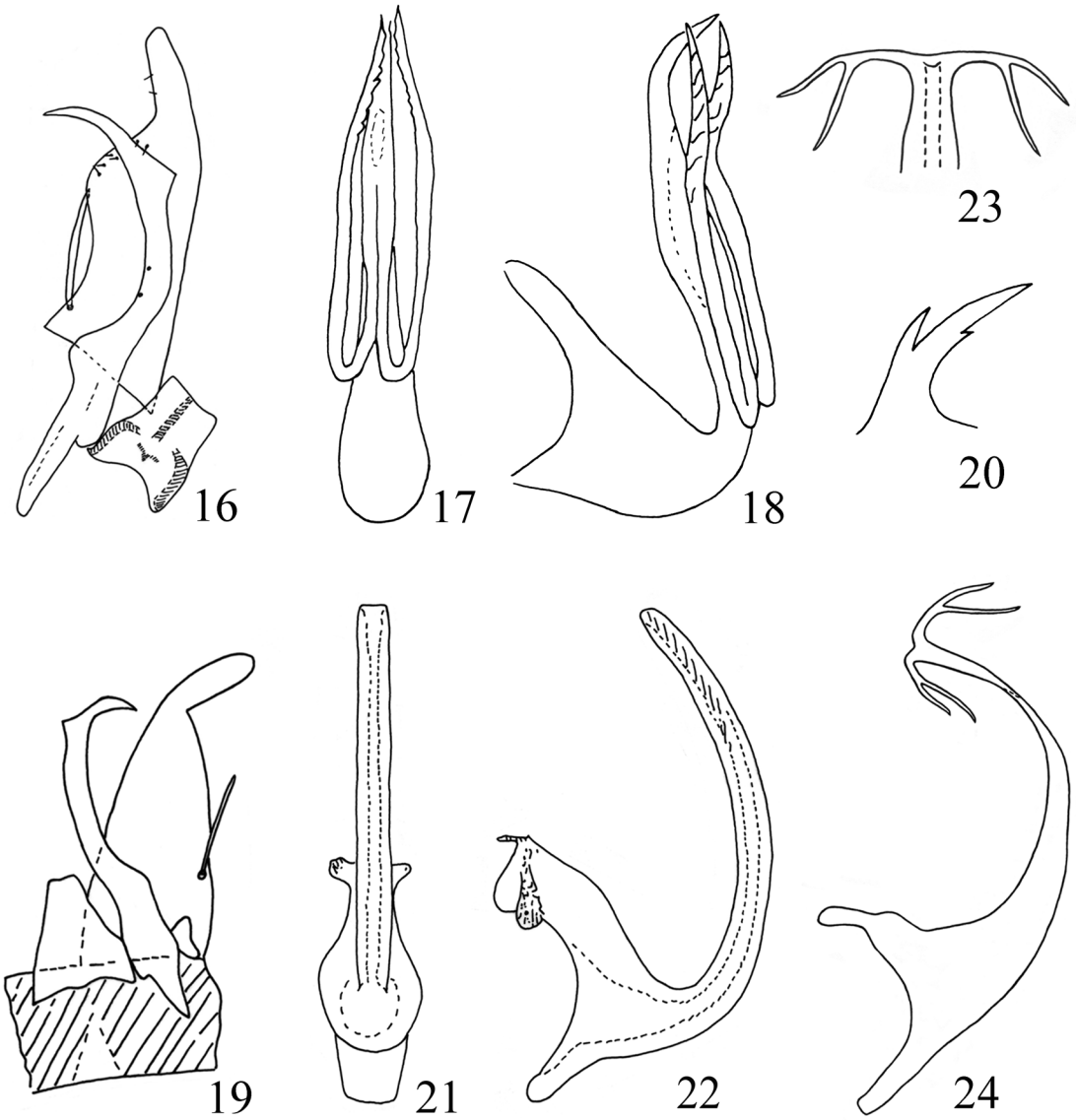
1. *Eupteryx* (*Stacla*) *janeki* Dworakowska, 1969, n. rec.
(Figs 1–3, 16–18)

Eupteryx (*Stacla*) *janeki* Dworakowska, 1969: 439; Dworakowska, 1982: 176; Dworakowska, 1994: 138

Material examined. 1♂, Yunnan Prov., Mengyuan, altitude 1000m, 18. XII. 1999, coll. Dworakowska; 2♀♀, Yunnan Prov., Jinghong, altitude 1600m, 25. XII. 1999, coll. Dworakowska; 2♀♀, Yunnan Prov., Mengyang Sanchahe, altitude 850m, 19. XII. 1999, coll. Dworakowska.



FIGURES 1–15. 1–3, *Eupteryx* (*Stacla*) *janeki* Dworakowska. 1, habitus, dorsal view; 2, habitus, lateral view; 3, face of male; 4-6, *Eupteryx* (*Stacla*) *albonigra* Dworakowska. 4, habitus, dorsal view; 5, habitus, lateral view; 6, face of male; 7–9, *Eupteryx* (*Stacla*) *hela* Dworakowska. 7, habitus, dorsal view; 8, habitus, lateral view; 9, face of male; 10–12, *Eupteryx* (*Stacla*) *irminae* Dworakowska. 10, habitus, dorsal view; 11, habitus, lateral view; 12, face of male; 13–15, *Eupteryx stachydearum* (Hardy). 13, forewing; 14, hindwing; 15, anterior dorsum, lateral view.



FIGURES 16–24. 16–18, *Eupteryx* (*Stacla*) *janeki* Dworakowska, (16, from Yunnan; 17, 18, after Dworakowska, 1969). 16, paramere, connective, subgenital plate, dorsal view; 17, aedeagus, posterior view; 18, aedeagus, lateral view. 19–22, *Eupteryx* (*Stacla*) *albonigra* Dworakowska, (19, 21, 22, after Dworakowska, 1994; 20, from Yunnan). 19, paramere, connective, subgenital plate and sternite IX, dorsal view; 20, anal hook; 21, aedeagus, posterior view; 22, aedeagus, lateral view. 23–24, *Eupteryx stachydearum* (Hardy), (after Dworakowska, 1982). 23, apex of aedeagus, posterior view; 24, aedeagus, lateral view.

2. *Eupteryx* (*Stacla*) *albonigra* Dworakowska, 1994, n. rec.
(Figs 4–6, 19–22)

Eupteryx (*Stacla*) *albonigra* Dworakowska, 1994: 137

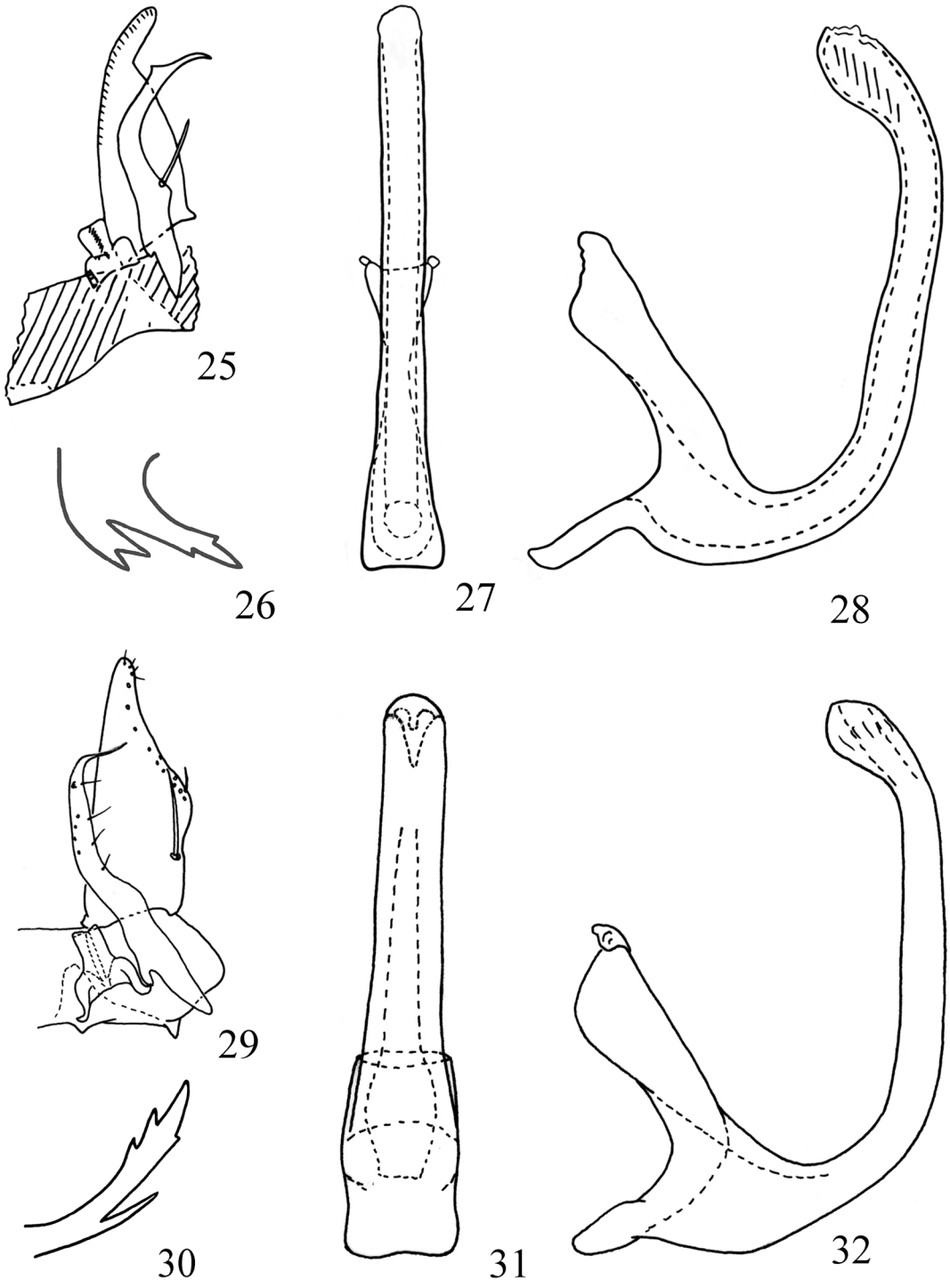
Material examined. 1♂1♀, Yunnan Prov., Mengla Nangong Mountain, altitude 1850m, 13. XI. 1999, coll. Dworakowska.

3. *Eupteryx* (*Stacla*) *hela* Dworakowska, 1982, n. rec.
(Figs 7–9, 25–28)

Eupteryx (*Stacla*) *hela* Dworakowska, 1982: 176

Material examined. 1♂1♀, Yunnan Prov., Mengyuan, altitude 1000m, 18. XII. 1999, coll. Dworakowska; 1♂, Yunnan Prov., Lijiang, altitude 2350m, 13. XII. 1999, coll. Dworakowska; 5♂♂4♀♀, Yunnan Prov., Tengchong, altitude 1650m, 26. IV. 1981, coll. Jikun Yang; 1♀, Yunnan Prov., Kunming West Mountain, altitude 2000m, 16. V. 1981, coll. Jikun Yang.

Notes: The specimens collected from Yunnan Province have the anal hook with more spines than the *E.* (*S.*) *hela* from Nepal (Pokhara) as drawn by Dworakowska (1982), but other features of the genitalia are very similar so these two populations are considered conspecific.



FIGURES 25–32. 25–28, *Eupteryx* (*Stacla*) *hela* Dworakowska, (25, after Dworakowska, 1969; 26, from Yunnan; 27, 28, after Dworakowska). 25, paramere, connective, subgenital plate and sternite IX, dorsal view; 26, anal hook; 27, aedeagus, posterior view; 28, aedeagus, lateral view. 29–32, *Eupteryx* (*Stacla*) *irminae* Dworakowska (from Sichuan). 29, paramere, connective, subgenital plate and sternite IX, dorsal view; 30, anal hook; 31, aedeagus, posterior view; 32, aedeagus, lateral view.

4. *Eupteryx* (*Stacla*) *irminae* Dworakowska, 1969, n. rec.
(Figs 10–12, 29–32)

Eupteryx (*Stacla*) *irminae* Dworakowska, 1969: 440; Dworakowska, 1982: 176; Dworakowska, 1994: 138

Material examined. 1♂, Sichuan Prov., Minya Konka Mountain, altitude 2400m, 5. XI. 1999, coll. Dworakowska; 1♀, Sichuan Prov., Minya Konka Mountain, altitude 2650m, 5. XI. 1999, coll. Dworakowska; 1♀, Sichuan Prov., Emei Mountain, altitude 1650m, *Rubus*, 31. XI. 1999, coll. Dworakowska; 21♂♂22♀♀, Yunnan Prov., Mengla Nangong Mountain, altitude 1850m, *Artemisia*, *Urticaceae*, 13. XI. 1999, coll. Dworakowska.

Notes: The specimens collected from Yunnan and Sichuan have a rhombic pattern on the crown and spiny anal hook which differ from the *E.* (*S.*) *irminae* from East Nepal (Taplejung) as illustrated by Dworakowska (1969), but other features of the genitalia are very similar so these two populations are considered conspecific.

5. *Eupteryx stachydearum* (Hardy, 1850), n. rec.
(Figs 13–15, 23–24)

Typhlocyba stachydearum Hardy, 1850: 122
Eupteryx stachydearum Marshall, 1867: 268; Vilbaste, 1973: 26; Dworakowska, 1982: 174
Eupteryx hortensis Curtis, 1833 nomen oblitum

Material examined. 1♂, Xinjiang, Huocheng Forest Farm, 2. VIII. 1991, coll. Bian Xiyuan; 1♂, Xinjiang, Yining, 21. II. 2002, coll. Bian Xiyuan; 1♂, Xinjiang, Ili Forestry Bureau, 25. VIII. 2001, coll. Bian Xiyuan.

6. *Eupteryx* (*Stacla*) *gracilirama* sp. nov.
(Figs 33–42)

Description. Body dull yellow. Vertex and pronotum mostly dark brown with symmetrical yellow spots. Vertex with three yellow spots anteriorly and one posteriorly; coronal suture slightly yellow. Pronotum with 5 faint parallel longitudinal yellow stripes medially and bilaterally. Scutellum yellow medially. Forewing with two round yellow patches in basal half and several round colourless patches in apical half. Hindwing slightly infuscated with longitudinal veins brown (Figs 33–35). Dorsum of abdomen brown, venter yellow excepting last 2 segments light brown.

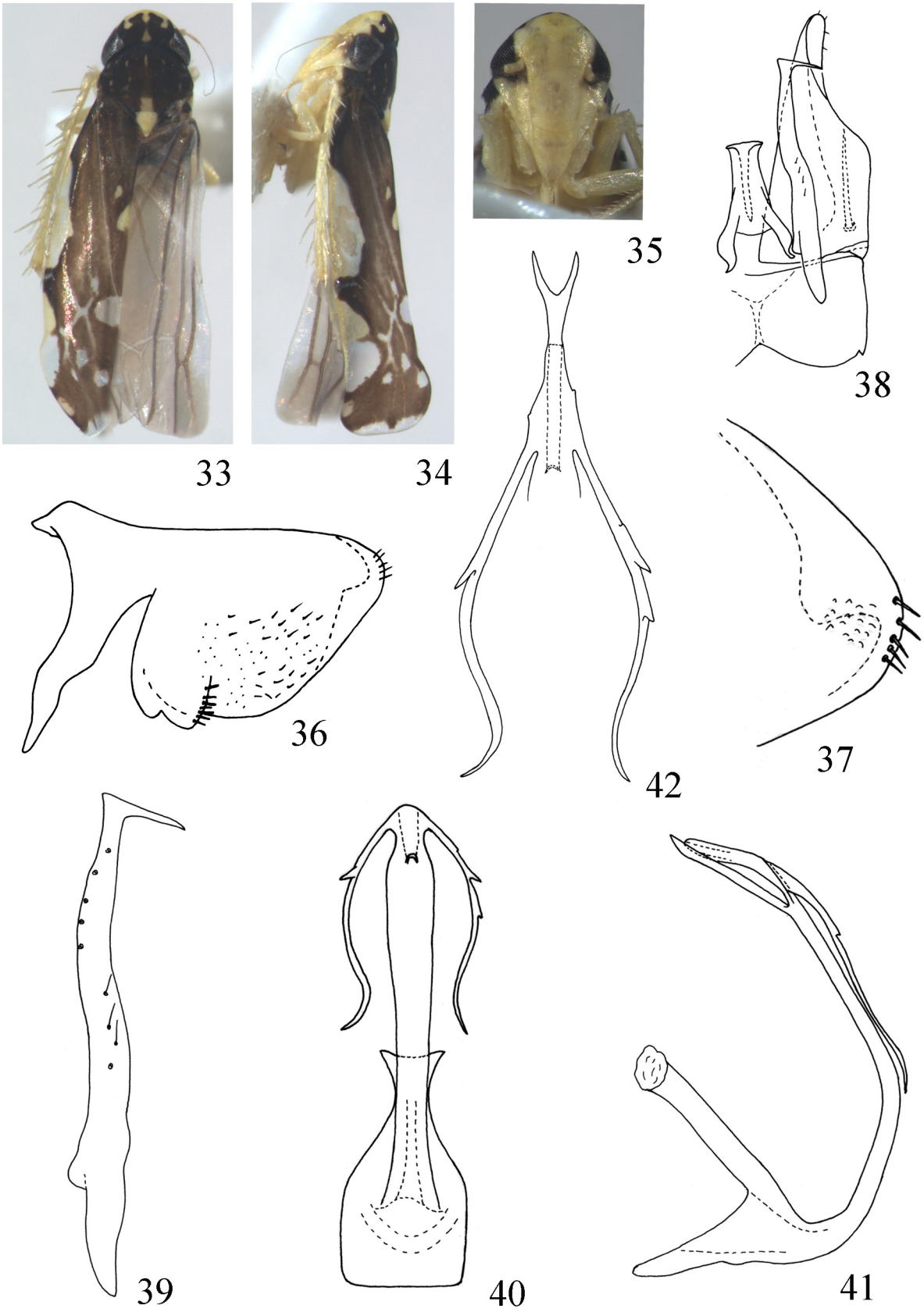
Abdominal apodemes extending to middle of 5th segment. Hind margin of pygofer side rounded and slightly produced with several small rigid setae apically, and base of ventral margin with a row of rigid setae (Figs 36–37). Subgenital plate with long macroseta basally, and with row of microsetae at outside margin apically (Fig. 38). Outer margin of paramere bent at acute angle subapically (Fig. 39). Connective Y-shaped, with lateral arms slender. Aedeagus shaft with pair of long, slender S-shaped ventral processes and Y-shaped median dorsal process apically, ventral processes extending to base of shaft with outer margins bearing few irregularly placed spines; dorsoatrium slender (Figs 40–42).

Measurement. Male 3.06 mm and female 3.07 mm (including wing).

Type material. Holotype, ♂, Yunnan Prov., Dali, altitude 2000m, *Labiatae*, 11. XI. 1999, coll. Dworakowska; Paratype, 2♀♀, same data as holotype; 3♀♀, Tengchong, altitude 2000m, *Artemisia*, 26. XI. 1999, coll. Dworakowska.

Notes. The new species closely resembles *Eupteryx pentavittatus* Hu & Kuoh in the external appearance, but its patch on vein ScP+RA is smaller than the patch in the 4th apical cell which is opposite to the condition in *Eupteryx pentavittatus*. Moreover, the male genitalias are distinctive: the paired processes at the apex of aedeagus in the new species are lacking in *Eupteryx pentavittatus.*

Etymology. The specific name is derived from a combination of the Latin prefix "gracil-" (slender) and the Latin word "rama" (twig), which refers to the aedeagal processes.



FIGURES 33–42. *Eupteryx* (*Stacla*) *gracilirama* **sp. nov.** 33, habitus, dorsal view; 34, habitus, lateral view; 35, face of male; 36, male pygofer, lateral view; 37, hind margin of male pygofer, lateral view; 38, paramere, connective, subgenital plate and sternite IX, dorsal view; 39, paramere; 40, aedeagus, posterior view; 41, aedeagus, lateral view; 42, apical part of aedeagus, dorsal view.

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