



Five new leafhopper species of the genus *Typhlocyba* Germar (Hemiptera: Cicadellidae: Typhlocybinae) from China

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Abstract

Five species, *T. napoensis*, *T. bilaminata*, *T. serrata*, *T. triannulata* and *T. tubercula* **spp. nov.**, of genus *Typhlocyba* Germar from China are described and illustrated. A key to males of Chinese *Typhlocyba* species is provided.

Key words: taxonomy, key, description, distribution, illustration

Introduction

Typhlocyba is a large leafhopper genus with about 100 species distributed throughout the northern hemisphere. In addition, some genera previously treated as subgenera of *Typhlocyba* now belong to the *Typhlocyba* complex, such as *Empoa* Fitch (Hamilton, 1983), *Edwardsiana* Zachvatkin (Hamilton 1983, Vidano 1961), *Eupterycyba* Dlabola (Dlabola, 1958) and *Ficocyba* Vidano (Vidano, 1960). Oriental, Holarctic and African species of *Typhlocyba* were reviewed by Dworakowska (1979), who also redefined the genus and proposed four groups i.e., the *quercus*, *arborea*, *aptera* and *ethiopica* groups, to accommodate 39 species. According to Dworakowska's definition there are 18 known species of *Typhlocyba* in Asia and 4 known species in China: *T. aptera* Dworakowska 1979, *T. babai* Ishihara 1958, *T. quercussimilis* Dworakowska 1967 and *T. quadripeticularis* Chiang, Hsu et Knight 1989. Here, we add five new species to the genus, of which one belongs to the *quercus* group, one belongs to *aptera* group and three belong to the *arborea* group. The new species are described and illustrated and a key to males from China and their groups is provided. The types and other specimens examined are deposited in the Northwest A&F University, Yangling, China (NWAUFU), the Institute of Zoology of Academia Sinica, Beijing, China (IZAS), and a few paratypes in the Natural History Museum, London (BMNH).

Typhlocyba Germar, 1833

Typhlocyba Germar, 1833: 180; Anufriev 1973: 505; Dworakowska 1979: 195.

Anomia Fieber 1866a: 509.

Type species: *Cicada quercus* Fabricius.

Diagnosis. Body slim and usually brightly colored, orange, yellowish-orange or reddish-orange. Head produced medially, median length usually longer than width between eyes. Forewing with 3rd apical cell triangu-

lar, petiolate. Hindwing with 2 open apical cells.

Abdominal apodemes not exceeding 6th sternite. Subgenital plate with single long macroseta near outer basal angle, apex often modified. Paramere slender, without apical tooth. Connective short and robust, nearly M- or Y-shaped. Aedeagus with shaft slim; processes derived from base or apex of shaft, paired or single; gonopore apical.

Key to males of species of *Typhlocyba* from China (males)

- 1 Pygofer side bilobed at upper posterior margin (Fig. 46)..... *aptera* group 2
Pygofer side not bilobed3
- 2 Aedeagal shaft with single apical process *T. aptera*
Aedeagal shaft with paired apical processes..... *T. bilaminata* **sp. nov.**
- 3 Processes arising from base of aedeagal shaft (Figs 10,11)..... *quercus* group 4
Processes arising from apex or subapex of aedeagal shaft..... *arborea* group 6
- 4 Color pattern on forewing uninterrupted (Fig. 2); aedeagal shaft with processes sinuate in both posterior and lateral view (Figs 10, 11) *T. napoensis* **sp. nov.**
Color pattern on forewing interrupted; aedeagal shaft with processes not sinuate in both posterior and lateral view.....5
- 5 Aedeagal shaft with sides nearly parallel, apical parts of processes slightly arched..... *T. babai*
Aedeagal shaft swollen in middle, apical parts of processes slightly curved..... *T. quercussimilis*
- 6 Pygofer side with long fingerlike protrusion from upper posterior margin (Fig. 16); subgenital plate with tuberculate protrusion at apex (Fig. 18)..... *T. tubercula* **sp. nov.**
Pygofer side without long fingerlike protrusion from upper posterior margin; subgenital plate without tuberculate protrusion at apex.....7
- 7 Aedeagus with processes nearly touching shaft, directed basad (Figs 40-42)..... *T. serrata* **sp. nov.**
Aedeagus with processes divergent from shaft, directed dorsad8
- 8 Aedeagus with one pair of bifurcate processes (Figs 30, 31)..... *T. triannulata* **sp. nov.**
Aedeagus with two pairs of non-bifurcate processes..... *T. quadriappendicula*

Typhlocyba napoensis **sp. nov.**

Figs 1–11.

Description. Color pattern of dorsum as in Figs 1–2. Patches on pronotum and scutellum and irregularly sinuated band on forewing, reddish-orange; basal triangles of scutellum surrounded by red streaks; small spot on base of 3rd apical cell blackish brown. Abdomen ivory.

Abdominal apodemes reaching to end of 5th abdominal sternite.

Male genitalia: Pygofer side tapering, with short finger-like protrusion at upper angle of posterior margin, with few setae beneath (Figs 4–5). Subgenital plate slender gradually narrowing caudad and knob-like terminally (Fig. 6); several short setae apically and subapically (Fig. 7). Paramere slim (Fig. 8). Connective nearly M-shaped (Fig. 9). Aedeagal shaft arcuate, with pair of basal processes sculptured on apical 1/3, sinuate and exceeding end of shaft (Figs 10–11).

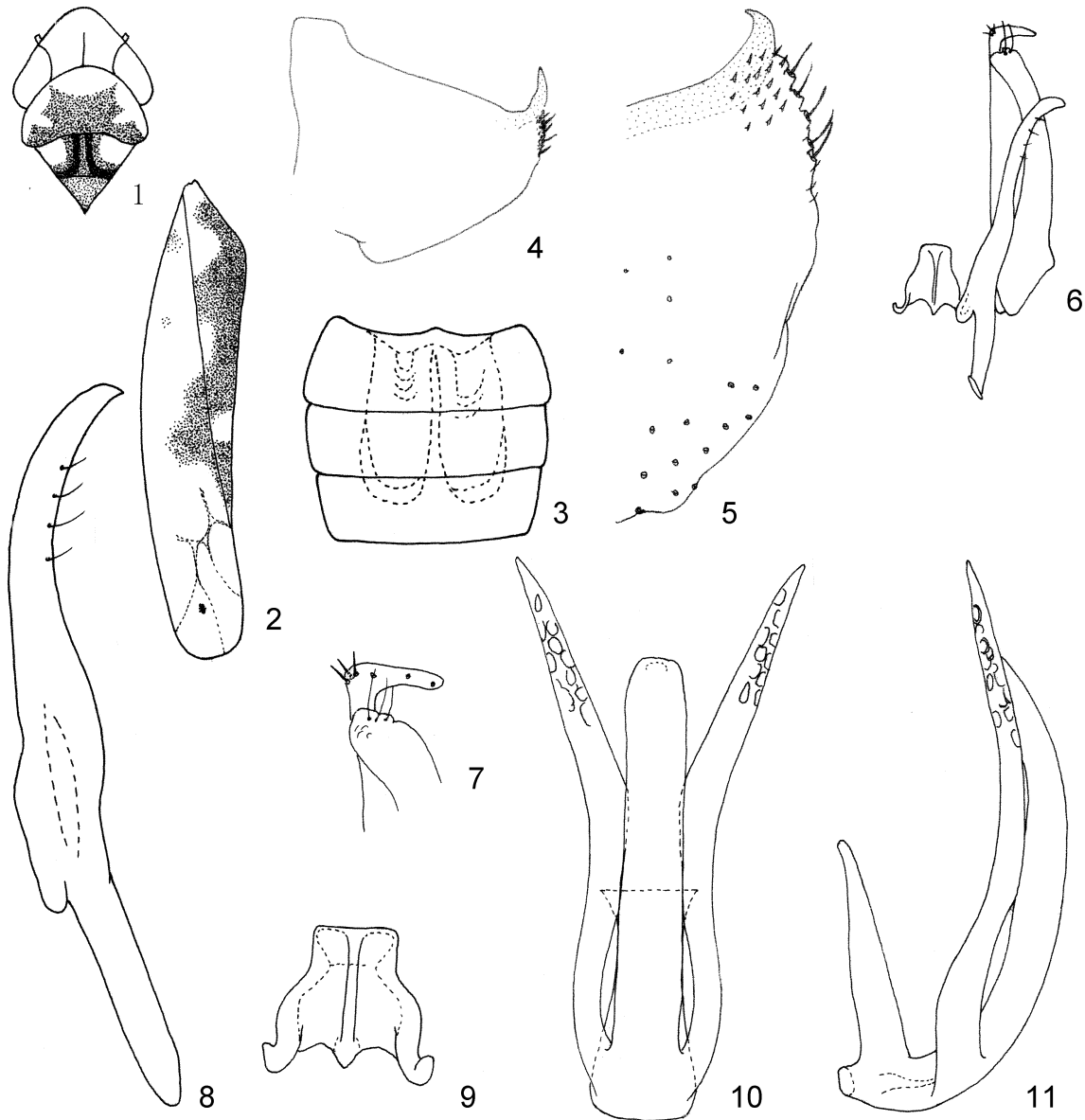
Measurement: Male, 2.94 mm (including wings).

Type material. Holotype: ♂, CHINA. Guangxi Province: Napo, Defu, 19.vi.2000, coll. Chaodong Zhu; paratype, 1 ♂, 19.vi.2000, same date as holotype, coll. Jian Yao (both IZAS).

Notes. The new species belongs to *T. quercus* group and resembles *T. irenae* Sharma (1984) in male geni-

talia, but can be distinguished by 1) aedeagal shaft with basal processes longer, exceeding end of shaft, while in *T. irenae* processes not reaching apex of shaft; 2) aedeagal shaft processes sinuate and close to shaft in posterior view, rather than straight and detached from shaft as in *T. irenae*; 3) color pattern on forewing brighter and uninterrupted, while in *T. irenae* patches on forewing irregular and interrupted.

Etymology. The specific name is derived from the type locality, Napo.



FIGURES 1–11. *Typhlocyba napoensis* sp. nov. 1, Anterior dorsum (crown, pronotum and scutellum, dorsal view). 2, Forewing. 3, Abdominal apodemes. 4, Male pygofer, lateral view. 5, Posterior part of male pygofer, lateral view. 6, Paramere, connective, subgenital plate, dorsal view. 7, Apical part of subgenital plate. 8, Paramere. 9, Connective. 10, Aedeagus, posterior view. 11, Aedeagus, lateral view.

***Typhlocyba tubercula* sp. nov.**

Figs 12–22.

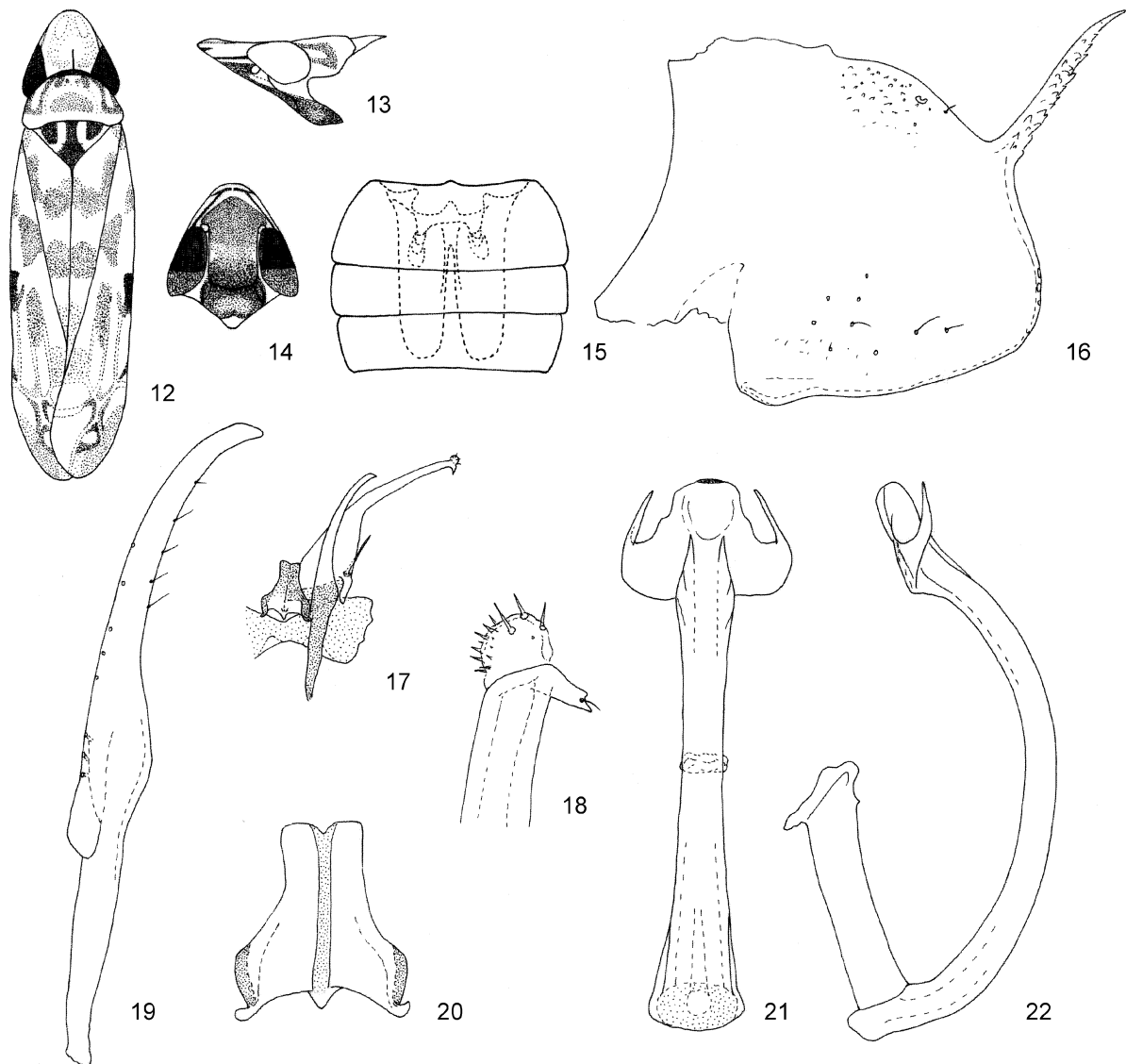
Description. Color pattern of dorsum as in Figs 12–14. Patches on vertex yellowish, thin streak on the lateral margin of vertex extending to anterior margin of face, then joining streak on anterolateral margin of face,

brown; clypeus and gena dark brown. Patches on anterior and lateral part of pronotum and on basal half of forewing reddish-orange, on the pronotum centrally orange, on distal end of clavus and adjacent area of corium yellowish-orange and on distal end of brochosoma field dark brown; apical part of forewing infusate. Abdomen and genital capsule dark brown.

Vertex concave centrally, with anterior margin produced apically, longer than pronotum (Figs 12–13).

Abdominal apodemes reaching to end of 5th abdominal sternite.

Male genitalia: Pygofer side with long finger-like protrusion at upper angle of posterior margin, serrated ventrally (Fig. 16). Subgenital plate broad basally, abruptly narrowed at median with apex digitate and twisted laterally (Fig. 17); corner of apex with a big tuberculate-like protrusion bearing numerous rigid microsetae (Fig. 18). Paramere slim and with base pigmented (Figs 17,19). Connective pigmented, nearly M-shaped (Fig. 20). Aedeagal shaft slim with pair of subapical upturned processes, broadened basally (Figs 21–22).



FIGURES 12–22. *Typhlocyba tubercula* sp. nov. 12, Habitus, dorsal view. 13, Anterior dorsum (crown, pronotum and scutellum, lateral view). 14, Face. 15, Abdominal apodemes. 16, Male pygofer, lateral view. 17, Paramere, connective, subgenital plate and sternite IX, dorsal view. 18, Apical part of subgenital plate. 19, Paramere. 20, Connective. 21, Aedeagus, posterior view. 22, Aedeagus, lateral view.

Measurement: male, 3.39 mm (including wings).

Type material. Holotype: ♂, CHINA. Yunnan Province: Sanchahe, 7.vi.1991, coll. Rungang Tian; para-

type, 1♂, same data as holotype (both NWAUFU).

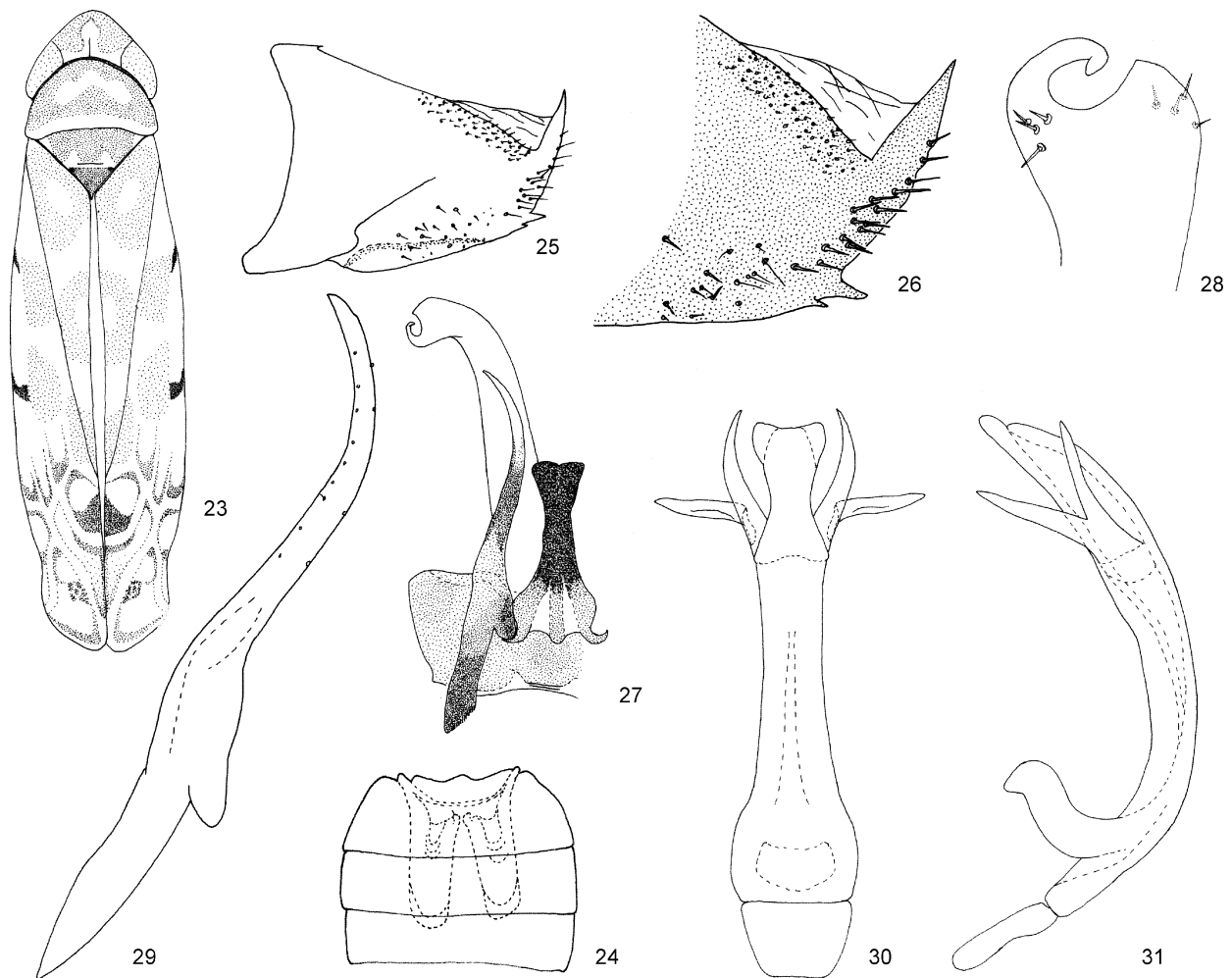
Notes. The new species belongs to *T. arborea* group and comes close to *T. equata* Dworakowska (1982) in shape of aedeagus but characteristics of pygofer, paramere and connective are similar to *T. quercus* group. The most characteristic features of the new species are apically produced and centrally concave vertex and shape of the subgenital plate which becomes abruptly slender at midlength and bears a big tuberculate protrusion at its apex.

Etymology. The specific name is derived from Latin word tuber, meaning protuberance, which refers to subgenital plate with a protrusion at its apex.

***Typhlocyba triannulata* sp. nov.**

Figs 23–31.

Description. Color pattern of dorsum as in Fig.23. Patches on vertex orange or light orange, on pronotum and scutellum orange. Forewing with distal part of longitudinal veins and transverse and apical veins yellowish, with basal patches yellowish ocher or yellowish orange; patches on both ends of brochosome field brown, apical part infuscate; subgenital plate and end of anal tube, ivory, remainder of abdomen including pygofer capsule, dark brown.



FIGURES 23–31. *Typhlocyba triannulata* sp. nov. 23, Habitus, dorsal view. 24, Abdominal apodemes. 25, Male pygofer, lateral view. 26, Posterior part of male pygofer, lateral view. 27, Paramere, connective, subgenital plate and sternite IX, dorsal view. 28, Apical part of subgenital plate. 29, Paramere. 30, Aedeagus, posterior view. 31, Aedeagus, lateral view.

Abdominal apodemes reaching to base of 5th abdominal sternite.

Male genitalia: Pygofer side narrowing caudally (Fig. 25), with well developed broad finger-like protrusion at upper angle of posterior margin, with 2–3 teeth at caudoventral margin, margin between protrusion and teeth with some rigid microsetae (Fig. 26). Subgenital plate slender with 2 groups of rigid microsetae at inner and outer apical margin, apex hook-like (Fig. 28). Paramere pigmented with distal part slender (Fig. 29). Connective well developed, stem slender, nearly twice length of arms (Fig. 27). Aedeagal shaft relatively short with pair of bifurcate, distally directed, subapical processes (Figs 30–31).

Measurement: male, 3.63 mm (including wings).

Type material. Holotype: ♂, CHINA. Sichuan Province: Mianning, Alt. 1650 m, 8.xi.1999, coll. I. Dworakowska; paratype, 1♂, Sichuan Province: Batang, Zhubalong, Alt. 2450 m, 10.vii.2001, coll. Qiang Sun, light trap (both NWAUFU).

Notes. The new species belongs to *T. arborea* group and is similar to *T. equata* Dworakowska (1982) in color pattern, but can be distinguished from the latter by 1) pygofer side with long protrusion at upper angle of posterior margin; 2) subgenital plate with apex hook-like; 3) connective nearly Y-shaped; 4) aedeagal subapical processes bifurcate; while in *T. equata* pygofer side with protrusion not obvious; subgenital plate with apex finger-like; connective nearly M-shaped; aedeagal processes not furcated.

Etymology. The specific name is a combination of the Latin prefix tri- meaning three and the Latin word annulus, meaning ring, referring to the three ring-like marks on the forewings.

Typhlocyba serrata sp. nov.

Figs 32–42.

Description. Color pattern of dorsum as in Fig. 32. Vertex with elliptical patch at most anterior margin extending to face and patches next to eyes, yellowish-orange, short streaks near to lateral margin brown; pronotum and scutellum with reddish-orange patches at anterior and posterior margin, yellowish-orange at central pronotum; forewing with basal patches yellowish-orange, with central patches yellowish-ocher, and with all patches bordered with brown; brochosoma field with basal end yellowish-orange, distal end yellowish-ocher; apical part of forewing infuscate, apical veins yellowish. Dorsal part of abdomen, pygofer capsule and anal tube dark brown.

Abdominal apodemes reaching to end of 5th abdominal sternite.

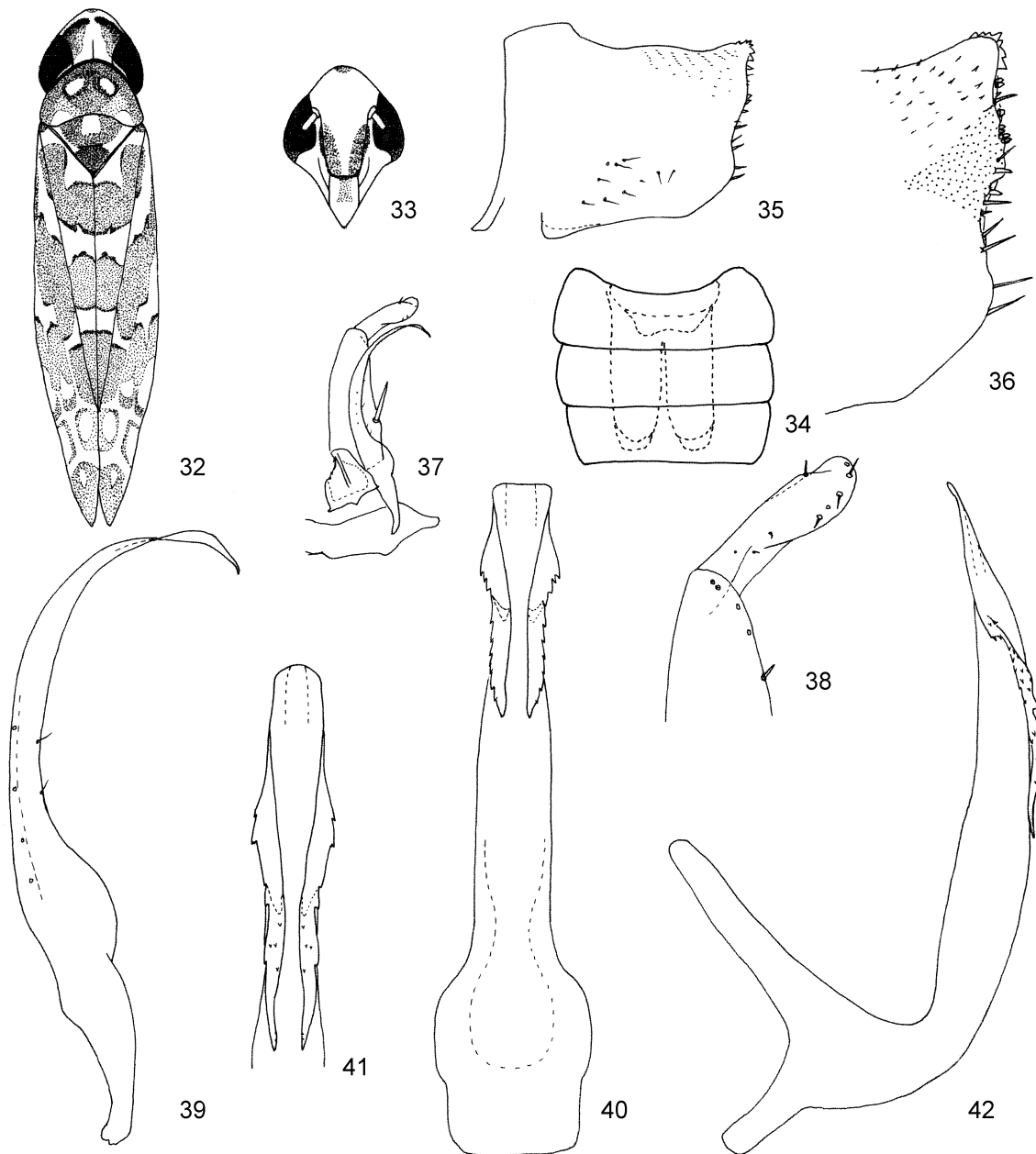
Male genitalia: Pygofer side broad with several teeth at upper angle of posterior margin and below with some short and rigid microsetae (Figs 35–36). Subgenital plate with distal 1/3 narrowed and twisted ventrolaterally (Figs 37–38). Paramere with caudal part slim and tapering more than twice length of central part (Fig. 39). Connective nearly M-shaped (Fig. 37). Aedeagal shaft relatively straight with pair of parallel distal processes, serrated on outer margin and directed ventrobasally (Figs 40–42).

Measurement: male, 2.57 mm (including wings).

Type material. Holotype: ♂, CHINA. Yunnan Province: Sanchahe, 7.vi.1991, coll. Rungang Tian; (NWAUFU); paratypes, 16♂, same data as holotype (NWAUFU and including 2 in BMNH)

Notes. The new species belongs to the *T. arborea* group and resembles *T. yacaba* Dworakowska (1994) in colour pattern and male genitalia but can be distinguished by aedeagus with processes apically and directed ventrobasally and with serrations at outer margin.

Etymology. The specific name is derived from Latin word serratus, meaning jagged like a saw referring to the serrated processes of aedeagus.



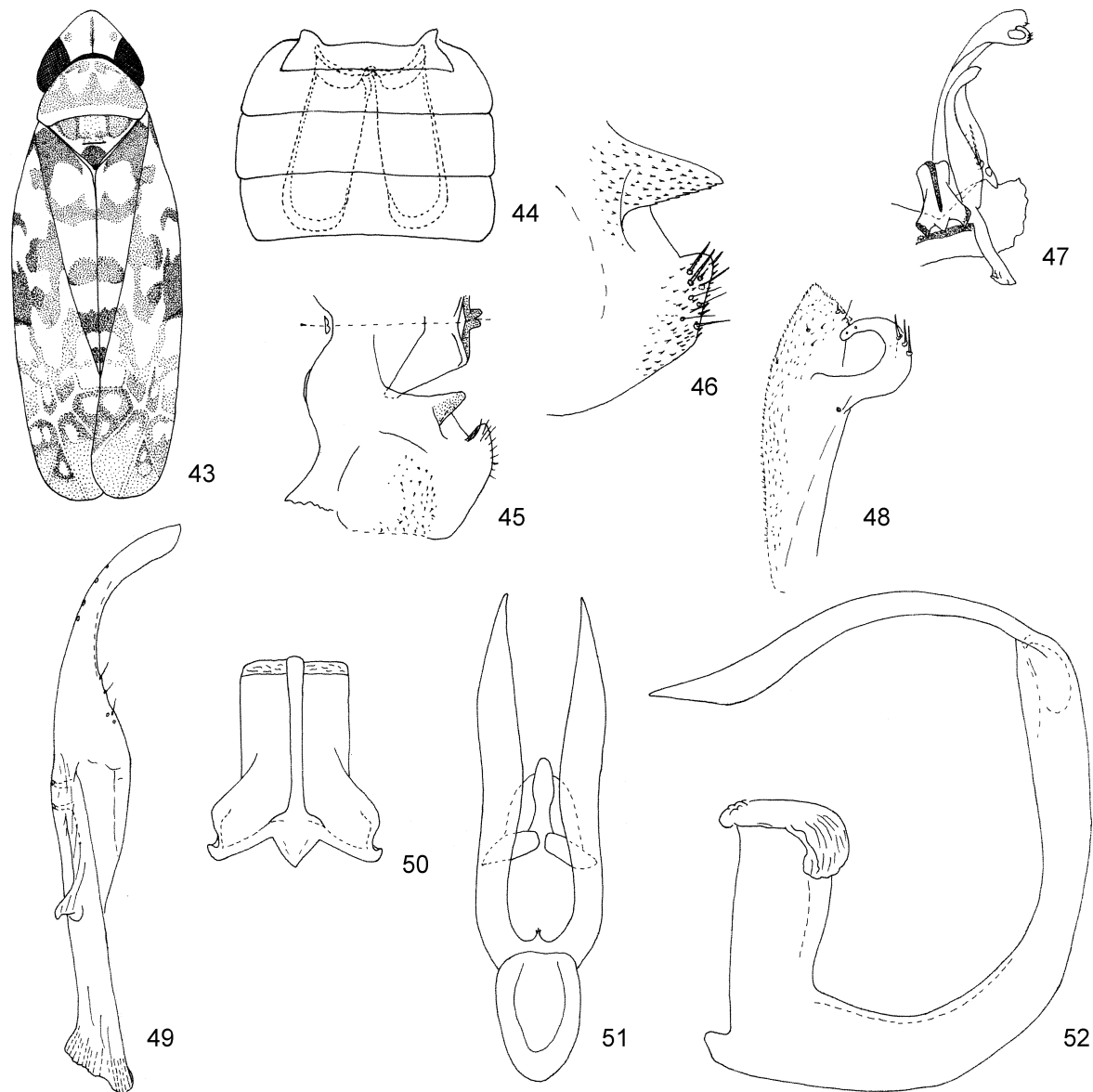
FIGURES 32–42. *Typhlocyba serrata* sp. nov. 32, Habitus, dorsal view. 33, Face. 34, Abdominal apodemes. 35, Male pygofer, lateral view. 36, Posterior part of male pygofer, lateral view. 37, Paramere, connective, subgenital plate and sternite IX, dorsal view. 38, Apical part of subgenital plate. 39, Paramere. 40, Aedeagus, posterior view. 41, Apical part of aedeagal shaft, posterior view. 42, Aedeagus, lateral view.

***Typhlocyba bilaminata* sp. nov.**

Figs 43–52.

Description. Color pattern of dorsum as in Fig. 43. Patches on vertex and pronotum orange, basal triangles of scutellum reddish brown surrounded by reddish orange, end of scutellum and basal patches of forewing, reddish orange; distal end of brochosome field brownish orange with apical part infuscate. Abdomen with dorsal part brown, pygofer with upper posterior part dark brown, end of anal tube light orange.

Abdominal apodemes reaching to end of 5th abdominal sternite.



FIGURES 43–52. *Typhlocyba bilaminata* sp. nov. 43, Habitus, dorsal view. 44, Abdominal apodemes. 45, Male pygofer, lateral view. 46, Posterior part of male pygofer, lateral view. 47, Paramere, connective, subgenital plate and sternite IX, dorsal view. 48, Apical part of subgenital plate. 49, Paramere. 50, Connective. 51, Apical part of aedeagal shaft, dorsal view. 52, Aedeagus, lateral view.

Male genitalia: Pygofer side bilobed at posterior margin, upper lobe triangular and pigmented, lower one truncate and with several rigid microsetae along posterior margin (Figs 45–46). Subgenital plate broadened basally, narrowed medially, and slightly broadened again distally (Fig. 47), with hook-like protrusion subapically (Fig. 48). Paramere with central part robust (Fig. 49). Connective robust, nearly M-shaped (Fig. 50). Aedeagal shaft moderately slender and angularly curved, with pair of long parallel distal processes, blade-like, directed dorsally (Figs 51–52).

Measurement: male, 3.05 mm (including wings).

Type material. Holotype: ♂, CHINA. Yunnan Province: Sanchahe, 7.vi.1991, coll. Rungang Tian (NWAUFU); paratypes, 22♂, same data as holotype (NWAUFU and including 2 in BMNH).

Notes. The new species belongs to *T. aptera* group and is similar to *T. aptera* Dworakowska (1979) in male genitalia but can be distinguished from the latter by paired blade-like distal processes of aedeagal shaft.

Etymology. The specific name is a combination of the Latin prefix *bi* meaning two and the Latin word *lamina*, meaning blade which refers to blade-like aedeagal processes.

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