New synonymy in the leafhopper genus *Stegelytra* Mulsant and Rey and description of a new genus (Hemiptera: Cicadellidae: Stegelytrinae)

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Abstract

The synonymy of *Iberia* Kirkaldy, 1907 with *Stegelytra* Mulsant and Rey, 1855 is reinstated; *Iraqerus* Ghauri, 1972 is synonymized with *Stegelytra*, syn. nov. and the type species of *Iraqerus*, *S. niveosparsus* (Ghauri, 1972), comb. nov. is figured and placed as a new senior synonym of *S. sororcula* Dlabola, 1974, syn. nov. A new stegelytrine genus, *Daochia* gen. nov., with reticulate forewing venation similar to that of *Stegelytra*, is described and placed in the subfamily Stegelytrinae. The following new species are described and illustrated, and a key for their separation: *Daochia reticulata* (type species), *D. longshengensis*, *D. bicornis* (all from China), and *D. fyanensis* (from Vietnam).

Keywords: China, Cicadellidae, Hemiptera, mud-puddling, new genus, new species, Vietnam

Introduction

The Palaearctic leafhopper genus *Stegelytra* (Hemiptera: Cicadellidae) was erected by Mulsant and Rey in 1855 with its type species *S. alticeps* Mulsant and Rey. Kirkaldy (1907) stated that there were two genera confused under the name *Stegelytra* and erected a new genus, *Iberia*, with its type species *S. bolivari* Signoret. Subsequently, Ghauri (1972) erected *Iraqerus*, with type species *Iraqerus niveosparsus* Ghauri (Figures 1–14), and considered that it occupied an intermediate position between the other two genera, based on the following characters: four subapical cells in the fore wing (in common with *Iberia*), two pairs of aedeagal appendages (in common with *Stegelytra*) and sharing the same host-plant genus, *Quercus*, in common with both of them. Nast (1972) listed *Iberia* as a synonym of *Stegelytra* but Oman et al. (1990) listed the two as separate genera.
Figures 1–14. *Stegelytra neveosparsus* (Ghauri) (1–3, 5–7, 9–11, 13 from original; 4, 8 modified from original). (1) Dorsal habitus. (2) Fore wing. (3) Hind wing. (4) Face. (5) Connective. (6) Apex of hind femur, lateral view. (7) Apex of hind tibia and first tarsomere. (8) Male genital capsule and anal tube, lateral view. (9) Subgenital plate. (10) Style. (11–13) Aedeagus, lateral, posterior, and ventral view, respectively. (14) Apex of female abdomen, ventral view.
In the present paper we reinstate the synonymy of *Iberia* with *Stegelytra* (see Remarks under *Stegelytra*), place *Iraqerus* as a new synonym of *Stegelytra* syn. nov., and place the type species of the former, *I. nevesparsus* comb. nov., as a new senior synonym of *S. sororcula* Dlabola syn. nov. These actions bring the total number of species in the genus to six (see checklist below). In addition we describe a new genus, *Daochia* gen. nov., for four new species from China and Vietnam, which like *Stegelytra* has reticulate fore wing venation. Both genera belong to the subfamily Stegelytrinae Baker, a group regarded as a tribe of Coelidiinae by Evans (1947), Metcalf (1964), and Ghauri (1972), but regarded as a subfamily by Ribaut (1952), Nast (1972), and Nielson (1975).

Stegelytrinae Baker is a small subfamily of Cicadellidae from the Palaearctic and Oriental regions. The group is distinguished by the following combination of characters: head distinctly narrower than pronotum with eyes strongly encroaching onto pronotum laterally, and relatively more dorsal in relation to pronotal carina in lateral view (except *Temburocera* Webb); face with lateral margins not or weakly incurved below eyes with antennae arising low on face (Figures 4, 16) and fore wing with cross-vein between claval veins and between outer claval vein and claval suture (Figures 2, 18). The following characters are also present in many but not all genera: hind femur with supranumerary macrosetae preapically, hind tibia with macrosetae on dorsal surface between rows AD and PD, commisural margin of fore wing thickened. Compared to other subfamilies of Cicadellidae, the included genera of Stegelytrinae are remarkably diverse and the Oriental genera were either only recently placed in the subfamily (being unassigned by Oman et al. 1990), or have been recently described (see Webb 1999; Zhang and Wei, 2002; Zhang et al. 2002, 2004, 2006a, 2006b; Wei and Zhang, 2003).

Although having reticulate venation, in common with *Stegelytra*, the new genus forms a distinctive group with the other Oriental stegelytrine genera, i.e. *Cyrta* Melichar, *Doda* Distant, *Kunasia* Distant, *Placidus* Distant, *Placidellus* Evans, *Paraplacidellus* Zhang, Wei and Shen, *Stenolora* Zhang, Wei and Webb, *Platyvalvata* Zhang, Wei and Webb, *Temburocera* Webb and *Wyuchiva* Zhang based on their very much longer antennae. The new genus also has two unusual features found in some other members of this group, i.e. the clypellus is expanded (also present in *Temburocera*) and the clypellus has two stout apical setae (also present in *Doda* and *Kunasia*). Features that separate the new genus from all other Stegelytrinae are: the pronotum with a sinuate posterior margin (Figure 15), and with the lateral carina straight; the apex of the fore wing truncate (Figure 18); the subgenital plates and valve fused (Figure 22); the style very elongate (Figure 23); and the apex of the aedeagus fimbriolate (Figure 26).

Unlike the Taiwanese Stegelytrinae *Placidus orientalis* Schumacher and *Pachymetopus decoratus* Matsumura that occur on *Fagus* (Fagaceae) and *Lisea acuminata* (Lauraceae), respectively, (C. Dietrich, personal communication), and the Palaearctic *Stegelytra* and *Wadkupfia* Linnavuori, that occur on oaks (*Quercus fagaceae*), the biology and host plants of other genera are unknown. However, a male specimen of *D. bicornis* sp. n., described here, together with some other male Stegelytrinae (Y.-L. Zhang et al., 2006a), were collected on exposed river banks. This habitat, connected to mineral uptake during feeding (“mud-puddling”), is well known in male Lepidoptera (Boggs and Dau 2004). Less well known is its occurrence in Cicadellidae (see review by Rakitov et al. 2005) but females are rarely collected in the aquatic vicinity and some less common cicadellid groups are implicated, i.e. Arrugadinae, Phereurhinini, and Neobalinae. Stegelytrinae are rare in collections, with many species known only from the male.
Figures 15–27. Daochia reticulata sp. n. (15) Head and thorax, dorsal view. (16) Face, male. (17) Face, female. (18) Fore wing. (19) Apical part of female abdomen, ventral view. (20) Second valvulae, left lateral view. (21) First valvulae, left lateral view. (22) Valve and subgenital plate, ventral view. (23) Aedeagus, paramere, and connective, dorsal view. (24) Male genital capsule and anal tube, left lateral view. (25) Aedeagus, left lateral view. (26) Aedeagus, posterior view. (27) Detail of antero-ventral corner of male pygofer, lateral view.

*Depositories*

Material examined is deposited in various institutions abbreviated in the text as follows: BMNH, Natural History Museum, London, UK; BPBM, Bernice P. Bishop Museum, Hawaii, USA; CAU, China Agriculture University, Beijing, China; IRSNB, Institute Royal des Science Naturelles de Belgique, Brussels; TJHM, Tianjin Natural History Museum, Tianjin, China.
Taxonomy

**Stegelytra** Mulsant and Rey

*Stegelytra* Mulsant and Rey 1855, p 224. Type species: *S. alticeps* Mulsant and Rey.

*Iberia* Kirkaldy 1907, p 40. Type species: *S. bolivari* Signoret, synonymy reinstated.

*Iraqerus* Ghauri 1972, p 207. Type species: *I. neveosparsus* Ghauri, syn. nov.

Remarks

Kirkaldy (1907) separated *Iberia* from *Stegelytra* based on the following characteristics: the anterior vertex shape, the shape of the anterior and posterior margins of the pronotum, and the number of subapical cells of the fore wing. These characters are considered either inaccurate or too unreliable to be used for diagnosing genera. For example, in reticulate fore wings the number of cells can vary between individuals of the same species.

Checklist of *Stegelytra*

Localities after Nast (1972); type locality first mentioned.

*Stegelytra* Mulsant and Rey 1855, p 224. Type species: *S. alticeps* Mulsant and Rey, by original designation.

*Iberia* Kirkaldy 1907, p 40, synonymy reinstated. Type species: *I. bolivari* Signoret, by original designation.

*Iraqerus* Ghauri 1972, p 207, syn. nov. Type species: *I. neveosparsus* Ghauri, by original designation.

*albofasciata* Linnavuori 1962, p 59, Figure 34f (Israel).

*alticeps* Mulsant and Rey 1855, p 225, Figures 15, 16 (Provence, France; Portugal; Spain); Ribaut 1952, p 321, Figures 856–862.

*psimmythimas* Walker 1851, p 893 = *Psimmythimas* Amyot 1848, p 416 [non binomen]; (syn. by Ribaut 1952, p 321, as *psymmitimas* [sic] Signoret, 1880) (France).

*bolivari* (Signoret 1880, p 203, Plate 7, Figure 67) (*Iberia*) (Spain).

*gavoyi* Ribaut 1952, p 322, Figure 867 (Languedoc, France).

*neveosparsa* (Ghauri 1972, p 207–208, Figures 1–11) (*Iraqerus*), comb. nov. (Iraq).

*sororcula* Dlabola 1974, p 49–50, Figures 40, 41 (Iran), syn. nov.

*putoni* Mulsant and Rey 1875, p 169 (Provence, France; Italy (also Sicily); Morocco; Portugal; Spain; Yugoslavia).

*erythoneura* [sic] Haupt 1924, p 229, Figure 1 (Israel); syn. by Dlabola 1963, p 328 (as *erythrocephala* [sic]).

*Stegelytra neveosparsa* (Ghauri) comb. nov. (Figures 1–14)

*Iraqerus neveosparsus* Ghauri 1972, p 207–208, Figures 1–11.

*Stegelytra sororcula* Dlabola 1974, p 49–50, Figures 40, 41 (Iran), syn. nov.

Material examined

Iraq: type series of *I. neveosparsus* Ghauri (BMNH).

Biology

Host-plants: *Quercus aegilops*, *Q. libani*, and *Q. infectoria*.
Remarks

To the original description the following can be added: vertex and face shagreened, genae rugose; face ventrally hairy; fore wings with adjacent inner margins of clavus elevated and adpressed (with wings in rest position); appendix of fore wing narrow (Figure 2); legs densely hairy; male genitalia with segment X lightly sclerotized; pygofer solidly attached to the valve along its lateral margin and with a short perpendicular hyaline band adjacent to the valve (Figure 8); subgenital plate with a small dorso-lateral basal process articulating with the pygofer membrane; aedeagus with shaft laterally compressed (Figure 12); dorsal connective firmly attached to aedeagus (Figure 11), plate-like in antero/posterior view (Figures 12, 13); female with second valvifers (in part) and third valvulae (entirely) exposed (Figure 14).

**Daochia gen. nov.**

*Type species.* *Daochia reticulata* sp. n.

Description

**Male.** Head distinctly narrower than pronotum; eyes encroaching onto pronotum laterally, in dorsal view. Vertex with median length shorter than width between eyes, rounded to front, depressed centrally, smooth; coronal suture extending to level of fore margin of eye; ocelli located on junction of face and vertex, approximately one-third own diameter from corresponding eye. Face as long as wide, lateral margin not incurved below eye; shagreened, finely rugose below eye; lateral frontal suture directed to outer margin of corresponding ocellus; transclypellar suture obscure medially; clypeus appearing pinched ventrally (more so in male); clypellus broad with apical area depressed laterally (both more so in male), convex in profile, anterior margin distinctly concave with a stout seta on each side; rostrum very short; labrum extended to near apex of labium; lora very narrow; gena somewhat longitudinally sulcate under eye; antennae very long, longer than body, arising near lower corner of eyes; basal antennal segment slightly more enlarged than normal; antennal ledge distinct. Pronotum short and broad, about three times broader than median length, smooth; lateral margin long with dorsopleural carina present, straight; posterior margin slightly sinuously concave. Scutellum longer than pronotum, basal width nearly as long as lateral margin; depressed at transverse suture, elevated to apex thereafter; transverse suture distinct. Fore wing elongate, venation reticulate subapically on anterior margin; claval veins united by cross-vein and a cross-vein present between inner claval vein and claval suture; apical margin of appendix nearly truncate. Legs with spinulation of deltocephaline type, without extra setae; hind femur long, apical setal formula 2+2+1 with setae not elevated on strong bases.

Male pygofer broad in lateral view with short to long macrosetae; dorsal margin long with a short lightly sclerotized area adjacent to anal tube in dorsal view; laterobasal corner with a short lightly sclerotized fracture and a slightly more dorsad lightly sclerotized patch in pygofer wall, posterior to fracture ventral margin thickened and infolded (Figure 22). Tenth segment very short and membranous. Valve fused with subgenital plate, the latter extended to near apex of pygofer, narrowly triangular shaped with an irregular row of moderately long macrosetae centrally over distal half of plate; a somewhat triangular-shaped process sub-basally, projecting into pygofer in lateral view; lateral margin folded inward. Paramere very long and narrow; inner basal apophysis short, outer basal apophysis elongate, tapered...
to apex; apical process elongate, tapered to narrowly rounded incurved apex, with several subapical setae at inner margin. Connective oblong with arms and stem poorly differentiated, medially weakly sclerotized. Aedeagal shaft in lateral view curved dorsad, fimbriolate apically, with one or two pairs of basal processes; basal apodeme moderately long, articulated with a hood-like dorsal connective in pygofer phragma.

Female. Pregenital sternite much longer than sternite VI. Second valvulae with dorsal hyaline region present one-third distance from base to apex, thereafter dorsal margin with fine closely set teeth.

Distribution
China and Vietnam.

Etymology
The generic name is an arbitrary combination of letters. Gender is feminine.

Biology
Not known (see Introduction).

Diagnosis
This genus is similar to Stegelytra in having reticulate fore wing venation but has many features in common with some other oriental genera recently placed in Stegelytrinae (see Introduction). It differs from these genera, in addition to its reticulate fore wing venation, in having the anteclypeus broad and convex with latero-apical areas depressed (similar to Thagria (Coelidiinae)), lora very narrow, pronotum with lateral carina straight and the posterior margin sinuate, valve fused with the subgenital plate, the latter with a sub-basal process, dorsal connective of the pygofer distant from the Xth segment, connective oblong with arms and stem undifferentiated, paramere very elongate and by the apically fimbriolate aedeagus.

Key to species (males)

1. Aedeagus with a long preatrium with an elongate and short pair of process arising from its base (Figure 31); China .................................. longshengensis
   – Aedeagus not as above .................................. 2

2. Aedeagus broadly U-shaped with a single pair of sub-basal processes (Figure 36); connective broad (Figure 33); China .............................. bicornis
   – Aedeagus and connective not as above .................. 3

3. Aedeagus with anterior processes short and posterior processes long (Figure 25); China .............................................. reticulata
   – Aedeagus with anterior processes long and posterior processes short (Figure 42); Vietnam .................................................. fyanensis
**Daochia reticulata** sp. n. (Figures 15–27)

*Description*

Body length 7.0–7.8 mm. Dorsum generally yellow-brown with pale yellow markings as in Figures 15–18; anterior part of anteclypeus, lora and gena reddish; ocelli red-brown. Fore wing with veins generally yellow-white with some basal veins dark red; a triangular-shaped pale yellow patch at mid-length of the fore margin. Sternum yellow-white, legs yellow-white to dark brown.

Male genitalia with connective narrow. Aedeagus with shaft moderately long and narrow, fimbriolate apically on posterior margin; a laterally broad basal process on each side and a slightly shorter more posterior process on each side, both pairs of processes slightly divergent in posterior view and following curve of shaft in lateral view.

*Type material*

Holotype: ♂ (CAU), P. R. China, Tibet: Bo-Mi Co., Yi Gong (30.01°N, 94.80°E), 2300 m, 31 July 1978, Fa-Sheng Li. Paratypes: P. R. China, Yunnan Prov.: 1 ♂ (CAU), Rui-Li Co., Nan-Jing-Li (24.00°N, 97.83°E), 4 May 1981, Fa-Sheng Li; 1 ♂ (CAU), Sichuan Prov.: Omei Shan, Wan-Nian Temple (29.53°N, 103.35°E), 1020 m, 16 July 1978, Fa-Sheng Li.

*Additional material.* The following female specimens that are generally paler than the males may be this species: P. R. China, Yunnan Prov.: 1 ♀ (CAU), Men-Hai Co., Nan-Nuo-Shan (21.95°N, 100.50°E), 1400 m, 2 March 1957, Da-Wei Liu; 1 ♀ (CAU), Xishuangbanna Dai Autonomous Prefecture (21.08°–22.36°N, 99.56°–101.50°E), 18 March 1957, Qiu-Zhen Liang.

*Etymology*

Named after the conspicuously reticulate fore wing venation.

*Biology*

Unknown (see Introduction).

**Daochia longshengensis** sp. n. (Figures 28–32)

*Description*

Body length 7.6 mm. Dorsum generally brown with pale yellow markings as in Figures 15–18; frontoclypeus with several dark ochre transverse symmetrical marks; anterior part of anteclypeus red; ocelli yellow-white margined red-brown. Fore wing with a triangular-shaped pale yellow patch at mid-length of the fore margin; sternum and legs yellow-white.

Disc of vertex distinctly concave; gena deeply longitudinally sulcate below eye.

Male genitalia with connective broad; anterior margin concave with a short medial projection. Paramere with inner basal apophysis broadly rounded. Aedeagal shaft elongate in lateral view, compressed antero-posteriorly, fimbriolate apically; a long preatrium present with a pair of short and a pair of long lateral appendages basally, the latter serrate apically on anterior surface.
Type material
Holotype: ♂ (TNHM), P. R. China: Guangxi Zhuang Autonomous Region: Long-Sheng Co., Tian-Ping-Shan (25.47°N, 110.00°E), 30 August 1964, Sheng-Li Liu.

Etymology
Named after its type locality.

Biology
Unknown (see Introduction).

Remarks
This species can be distinguished by its aedeagus with a long preatrium with a pair of short and a pair of long lateral appendages arising from its base.

**Daochia bicornis** sp. n. (Figures 33–38)

Description
Body length 6.5 mm. Dorsum and face generally yellowish brown with pale yellow markings as in Figures 15–18; eyes dark brown; ocelli red. Fore wing with veins generally red with claval veins yellow-white; a triangular-shaped pale yellow patch at mid-length of the fore margin. Sternum and legs yellow-white.

Male genitalia with connective broad. Aedeagus broadly U-shaped in lateral view; shaft very long and narrow, fimbriolate apically on anterior and posterior margin, an elongate
laterally serrate process on each side arising near mid-length and extended to slightly distal of shaft apex, slightly curved dorsally and adpressed to shaft.

Type material
Holotype: ♂ (IRSNB), P. R. China, Yunnan Prov., Meng-La Co. (21.48°N, 101.56°E), 7 March 1999, river, P. Grootaert.

Etymology
Named after its single pair of aedeagal processes.

Biology
See Introduction.

Remarks
This species can be distinguished by (1) broad connective; (2) broadly U-shaped aedeagus in lateral view; and (3) single pair of lateral aedeagal processes extending beyond shaft.
**Daochia fyanensis** sp. n. (Figures 39–44)

**Description**

Body length 7 mm. Dorsum and face generally yellow-brown with pale yellow markings as in Figures 15–18; anterior part of anteclupeus and lateral margin of postclypeus and gena red; eyes dark brown; ocelli red. Fore wing with veins generally red; a triangular-shaped whitish patch at mid-length of the fore margin. Sternum and legs yellow-white, posterior tibia darker.

Male genitalia with connective narrow. Aedeagus with shaft moderately long and narrow, laterally compressed, fimbriolate apically on posterior margin; a laterally broad basal process on each side, slightly expanded distally in posterior view and a narrower slightly shorter and more posterior process on each side, both pair of processes slightly divergent in posterior view and following curve of shaft in lateral view.

**Type material**

Holotype: ♂ (BPBM). Vietnam: Fyan (11.88°N, 21.20°E), 1200 m, 11 July to 9 August 1961, N. R. Spencer.

**Other material.** The following two specimens (BMNH and BPBM, respectively) may be this species: Vietnam: Tam Dao Mts (21.45°N, 105.64°E), 10 August and 5 September

![Figures 39–44. Daochia fyanensis sp. n. (39) Antero-ventral area of male pygofer, left lateral view. (40) Postero-dorsal area of male pygofer and anal tube, left lateral view. (41, 42) Aedeagus, posterior and left lateral view, respectively. (43) Connective and paramere, dorsal (left side) and ventral (right side) view. (44) Male pygofer and anal tube, dorsal view.](image-url)

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1993, V. Novotny (abdomen missing); Dalat, 6 km. S (11.1°N, 108.1°E), 1400–1500 m., 9 June to 7 July 1961, N. R. Spencer.

**Etymology**

Named after its type locality.

**Biology**

Unknown (see Introduction).

**Remarks**

This species is similar to *bicorns* but can be distinguished by (1) shaft more laterally compressed; (2) anterior processes of aedeagus longer; and (3) posterior processes of aedeagus shorter.

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