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The identity of the oriental leafhopper genera *Cyrta* Melichar and *Placidus* Distant (Hemiptera: Cicadellidae: Stegelytrinae), with description of a new genus

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Abstract

The identities of the Oriental leafhopper genera *Cyrta* Melichar and *Placidus* Distant are reviewed, and *Cyrta* is placed as a senior synonym of *Placidus*. The following new combinations and new species are proposed for *Cyrta*: *C. brunnea* (Kuoh) **comb. n.**; *C. dentata* (Zhang & Wei) **comb. n.**; *C. flosifronta* (Zhang & Wei) **comb. n.**; *C. furcata* (Li & Zhang) **comb. n.**; *Cyrta hornei* (Distant) **comb. n.**; *C. incurvata* (Wei & Zhang) **comb. n.**; *C. longwanshensis* (Li & Zhang) **comb. n.**; *C. nigrocupulifera* (Zhang & Wei) **comb. n.**; *C. orientalis* (Schumacher) **comb. n.**; *C. striolata* (Zhang & Wei) **comb. n.**; *C. testacea* (Kuoh) **comb. n.**; *C. vicina* (Dlabola) **comb. n.**; *C. tiantaishanensis* **sp. n.**; *C. spinosa* **sp. n.**; *C. conduplicata* **sp. n.**; C. *coalita* **sp. n.** and *C. fujianensis* **sp. n.** A new genus, *Paracyrta* **gen. n.**, is erected to accommodate the following species previously included in *Cyrta*: *P. blattina* (Jacobi) **comb. n.**; *P. recusetosa* (Zhang & Wei) **comb. n.**; *P. setosa* (Zhang & Sun) **comb. n.**; *P. banna* (Zhang & Wei) **comb. n.**; *P. bicolor* (Zhang & Wei) **comb. n.**; *P. longiloba* (Zhang & Wei) **comb. n.**; *P. dentata* (Zhang & Wei) **comb. n.**; *P. bimaculata* (Zhang & Sun) **comb. n.**; *P. parafrons* (Zhang & Wei) **comb. n.** A key is provided for the above species of *Cyrta* and the relationship between *Cyrta* and *Paracyrta* and other Oriental stegelytrine genera is given. The host plants and mud-puddling behaviour of the representatives of this subfamily are discussed.

Key words: Homoptera, Auchenorrhyncha, taxonomy, morphology, identification, new genus, new species, new synonym, new combination, mud-puddling

Introduction

The Oriental leafhopper genera *Cyrta* Melichar 1902 and *Placidus* Distant 1908 were formerly placed in Coelidiinae but excluded by Nielson (1975) and unassigned by Oman *et al* (1990). They were revised recently by Zhang *et al* (2002) and Zhang & Wei (2002) respectively and placed in Stegelytrinae Baker (Wei & Zhang 2003). Stegelytrinae is a relatively small subfamily with its genera restricted to either the Palaearctic or Oriental regions. In addition, its Oriental members are remarkably diverse and were either only recently placed in the subfamily, being unassigned by Oman *et al* (1990), or have been recently described or revised (see Webb 1999; Wei & Zhang 2003; Wei *et al.* 2006a, 2006b; Zhang & Wei 2002; Zhang *et al.* 2002, 2004, 2006a, 2006b, 2007).

During recent identification work on species of *Placidus* Distant the misidentification of its type species, *P. hornei* Distant, was revealed (see Discussion). In the present paper we clarify the identity of this species (and that of its genus) from its unique type (BMNH), and also examine and figure for the first time the male

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genitalia of the type species of *Cyrta* (*C. hirsuta* Melichar). Based on these studies, we conclude that *Placidus* is a junior synonym of *Cyrta*, but that other species of *Cyrta*, i.e., *C. blattina* Jacobi and the species erected by Zhang *et al* (2002), belong to a different genus (*Paracyrta* gen. n.). In addition, five new species of *Cyrta* are described and illustrated, and a key is provided to all the species.

Material and methods

External morphology was observed and illustrated under a Wild Heerbrugg Microscope and a Leitz Laborlux 12 Microscope. The male and female terminalia were dissected out, treated with 10% KOH solution at approximately 80°C for several minutes, and observed in a droplet of glycerol under a compound light microscope. The terminology of setal rows on legs follows Rakitov (1997).

Material examined is deposited in the following institutions abbreviated in the text as follows:

BMNH	The Natural History Museum, London, UK
BPBM	Bishop Museum, Honolulu, Hawaii, USA
CAU	China Agriculture University, Beijing, China
INHS	Illinois Natural History Survey, USA)
IRSNB	Institute royal des Science naturelles de Belgique, Brussels, Belgium
IZAS	The Institute of Zoology, Chinese Academy of Sciences in Beijing, China
MMB	Moravian Museum, Brno, Czech Republic
NKU	Nankai University, Tianjin, China
NWAFU	The Entomological Museum, Northwest A & F University, Yangling, Shaanxi, China
SHEM	The Entomology Museum, Chinese Academy of Sciences, Shanghai, China
TJHM	Tianjin Natural History Museum, Tianjin, China
ZSU	Zhongshan University, Zhongshan, China
ZFMK	Zoologishes Forschungsinstitut und Museum Alexander Koenig, Bonn, Germany

Taxonomy

Cyrta Melichar

Cyrta Melichar 1902: 136 (61). Type species: *Cyrta hirsuta* Melichar
Placidus Distant 1908: 342. Type species: *Placidus hornei* Distant. **Syn. n.**

Head small, distinctly narrower than pronotum (Fig. 1A). Vertex shorter or slightly longer than width between eyes; anterior margin rounded, sloping to front; posterior margin slightly concave; coronal suture distinct, extending nearly to anterior margin. Ocelli on vertex, near anterior margin, situated approximately their own diameters from corresponding eye. Face similar in length to width; lateral frontal suture extending well beyond corresponding ocellus; transclypeal suture indistinct; anteclypeus broadening apically, apical margin slightly convex, usually with pair of stout setae; gena flat; lora broad; rostrum long, about two thirds of anteclypeus; labrum about two thirds of labium; antenna about as long as body, arising adjacent to midpoint of inner margin of eye; antennal ledge indistinct; antennal pit shallow (Fig. 1B). Pronotum about 2.5~3X broader than median length; posterior margin slightly concave; lateral margin long with carina present, curved to eye anteriorly (Fig. 1A). Scutellum slightly longer than pronotum; basal width similar to width of head; transverse depression somewhat indistinct; posterior half weakly elevated and inclined from transverse suture; posterolateral ledge indistinct; tufts of hairlike setae present or absent on lateral margin (Fig. 1A). Forewing with five

apical cells; middle and outer subapical cells closed, inner subapical cell open; claval veins connected by crossvein to each other and to claval suture; appendix broad with margin rounded, extended to fourth apical cell; claval margin strongly elevated and crimped at apex. Hind wing venation complete. Legs densely setose. Fore femur with setae short to long: anterior surface with intercalary (IC) setae irregularly arranged and anteromedial (AM) setae long (Fig. 2A); dorsal surface with dense setae from base to apex, irregularly arranged, length of setae gradually increased apically, several very short anterodorsal (AD) setae basally (Fig. 2B); ventral surface with anteroventral (AV) setae long, posteroventral (PV) setae dense and irregularly arranged (Fig. 2C). Fore tibia with AD and PD seta short to very long, irregularly arranged (Figs 2D, 2E); AV and PV setal row extended from base to apex with AV setae relatively short (Fig. 2F). Hind femur slightly broadened distally, with several distal setae elevated on strong bases and several short setae subbasally (Fig. 2G). Hind tibia flattened and slightly bowed; several supernumeral setae present between AD and PD rows; PD setae very long (Fig. 2H).

Male pygofer side moderately long, with macrosetae and short setae near dorsal and apical margin; dorsal margin more or less straight; apical margin broadly or narrowly rounded (Fig. 3A); inner process present or absent (Figs 3A, 9F, G); posterior interconnecting membrane with weakly developed sclerotised areas comprising a long medial area (dorsal connective) between dorsal apodeme of aedeagus and Xth segment (Figs 1C, H). Valve large, posterior margin roundly or angularly produced distally in ventral view (Figs 1D, G). Subgenital plate subtriangular, extending near or slightly beyond apex of pygofer, several short to moderately long setae on ventral surface (Figs 1D, G); not fused, or fused basally to each other or to valve (Fig. 9F); sometimes with a sclerotised band medially basally articulated with style (Fig. 3C). Connective somewhat T-shaped; stem very long, well sclerotised medially, membranous laterally; arms strong (Figs 1C, E). Style with inner basal arm short, outer basal arm elongate; preapical lobe slightly developed with several setae adjacent to apical process; apical process long, extending near to apex of connective, abruptly or slightly expanded and crenulate subbsally, thereafter evenly tapered to apex (Fig. 1E). Aedeagus simple, with shaft moderately broad and long in lateral view (Fig. 1C), rarely with a pair of lateral processes (Fig. 5A); basal apodeme well developed, connected with dorsal connective; gonopore apical (Fig. 1C). Xth segment large, elongate (Fig. 1I).

Female 7th sternite much longer than 6th sternite; posterior margin roundly convex laterally, strongly concave medially (Fig. 4C). Female pygofer with ventroposterior margin incurved (Fig. 4A). First valvulae sculpture scale-like, comprising striations, aligned longitudinally basally and oblique distally (Fig. 4B). Second valvulae with blade-like area extending over distal half, with teeth somewhat fine and the dorsal margin of teeth finely serrate, dorsal sclerotised and hyaline areas present (Fig. 4D). Third valvulae with expanded distal region extending over distal half (Fig. 4E).

Distribution. Afghanistan, India, Nepal, China, Indonesia (Sabah).

Remarks. Based on an examination of the type of its type species (*C. hirsuta*) and other species, the identity of *Cyrta* is revised and the genus is found to be a senior synonym of *Placidus* (see also Discussion - Identity of Evans's *Placidus hornei*) and, with the exception of its type species, all other species previously placed in *Cyrta* (see Zhang *et al.* 2002) belong to a new genus (*Paracyrta*), described below. *Cyrta* can be distinguished from *Paracyrta* by its uniformly coloured pronotum, the presence of tufts of hairlike setae on the scutellum, the longer setae on the tibia, the shorter male pygofer and the longer apical extension of the style apical process. One new species of *Cyrta* (*C. conduplicata*) is the first species of the genus to be described from the Pacific (Sabah). Two species previously placed in *Placidus*, *P. leucomaculatus* Li & Zhang 2006 and *P. maculates* Li & Zhang 2007 (in Li *et al.* 2007), belong to another new genus (Wei *et al.* in press).

Checklist to species of *Cyrta*

brunnea (Kuoh 1992: 299, fig. 57, *Placidus*), **Comb. n.**, China.
coalita Wei, Webb & Zhang **sp. n.**, China.
conduplicata Wei, Webb & Zhang **sp. n.**, Sabah.
dentata (Zhang & Wei 2002: 68, fig. 4, *Placidus*), **Comb. n.**, China.
flosifronta (Zhang & Wei 2002: 67, fig. 3, *Placidus*), **Comb. n.**, China.
fujianensis Wei, Webb & Zhang **sp. n.**, China.
furcata (Li et Zhang 2006 : 155, figs 1–9, *Placidus*), **Comb. n.**, China.
hirsuta Melichar, 1902: 136 (61), plate V, figs 10, 10a–b, China.
hornei (Distant 1908: 342, *Placidus*), **Comb. n.**, India.
incurvata (Wei & Zhang 2003: 91–94, figs 1–7, *Placidus*), **Comb. n.**, Nepal.
longiprocessa (Li et Zhang 2007: 148–149, fig. 4, *Placidus*), **Comb. n.**, China.
longwanshensis (Li et Zhang 2006 : 155, figs 18–25, *Placidus*), **Comb. n.**, China.
nigrocupulifera (Zhang & Wei 2002: 70, fig. 5, *Placidus*), **Comb. n.**, China.
orientalis (Schumacher 1915: 104, *Placidus*), **Comb. n.**, China.
spinosa Wei, Webb & Zhang **sp. n.**, China.
striolata (Zhang & Wei 2002: 65, fig. 2, *Placidus*), **Comb. n.**, China.
testacea (Khoh 1992: 299, fig. 58, *Placidus*), **Comb. n.**, China.
tiantaishanensis Wei, Webb & Zhang **sp. n.**, China.
vicina (Dlabola 1957: 293, figs 136–139, *Placidus*), **Comb. n.**, Afghanistan.

Key to species of *Cyrta* (males)

1. Male pygofer with well developed lateral cleft (see Fig. 21 in Li & Zhang 2006) ..... *C. longwanshensis* (Li & Zhang)
- Lateral cleft of male pygofer absent or indistinct 2
2. Male pygofer with long inner process (Fig. 9G) 3
- Male pygofer without inner process 7
3. Aedeagus with a long lateral process basally ..... *C. flosifronta* (Zhang & Wei)
- Aedeagus without lateral process 4
4. Frontoclypeus with a somewhat funnel-shaped yellow longitudinal patch medially; style twisted, basal part laterally curved in dorsal view (see Figs 2 and 5 in Wei & Zhang 2003).... *C. incurvata* (Wei & Zhang)
- Frontoclypeus and style not as above 5
5. Aedeagus strongly narrowed subbasally in ventral view; valve articulated to subgenital plate (see Fig. 2E in Zhang & Wei 2002) ..... *C. striolata* (Zhang & Wei)
- Aedeagus not as above; valve fused to subgenital plate (Fig. 9F) 6
6. Inner process of male pygofer strongly curved dorsally, apex exceeding dorsal margin of pygofer side (Fig. 9G) ..... *C. coalita* sp. n.
- Inner process of male pygofer weakly curved dorsally, apex not exceeding dorsal margin of pygofer side (Fig. 10G) ..... *C. fujianensis* sp. n.
7. Aedeagus with pair of long lateral process basally (see Fig. 4 in Li *et al.* 2007) ..... *C. longiprocessa* (Li & Zhang)
- Aedeagus without basal process ..... 8.
8. Aedeagus very broad basally with several stout spines laterally on shaft (Figs 7 E, G) .... *C. spinosa* sp. n.
- Aedeagus not as above 9

9. Aedeagus with four apical processes (see Figs 6–7 in Li & Zhang 2006) ..... *C. furcata* (Li & Zhang)
- Aedeagus not as above 10
10. Aedeagal shaft with dense tubercles (Figs 6D–E) 11
- Aedeagus not as above 12
11. Aedeagal shaft strongly tapered from base to apex in lateral view (Fig. 6D) ..... *C. tiantaishanensis* sp. n.
- Aedeagal shaft weakly tapered from base to apex in lateral view (Fig. 1C) ..... *C. hirsuta* Melichar
12. Aedeagal shaft double layered at midlength, apex incised in ventral view (Figs 8C–D) ..... *C. condupulicata* sp. n.
- Aedeagus not as above 13
13. Aedeagal shaft strongly curved ventrally in lateral view with a pair of apical processes (Figs 5A, G) ..... *C. orientalis* (Schumacher)
- Aedeagus not as above 14
14. Aedeagus with lateral margin regularly serrate 15
- Aedeagus not as above 16
15. Connective Y-shaped; valve fused to subgenital plates (see Figs 4D–E in Zhang & Wei 2002) ..... *C. dentata* (Zhang & Wei)
- Connective T-shaped; valve articulated to subgenital plates (see Figs 57c, e in Kuoh 1992) ..... *C. brunnea* (Kuoh)
16. Style with basal part short and distinctly enlarged (see Fig. 5E in Zhang & Wei 2002) ..... *C. nigrocupulifera* (Zhang & Wei)
- Style normal, not as above 17
17. Forewing with dark transverse band at midlength (see Description in Dlabola 1957) ..... *C. vicina* (Dlabola)
- Forewing without dark transverse band 18
18. Body generally blackish brown; aedeagal shaft with lateral margins nearly parallel in ventral view (see Figs 1A, B and F in Zhang & Wei 2002) ..... *C. hornei* (Distant)
- Body generally light brown; aedeagul shaft distinctly broadened medially in ventral view (see Fig. 58b in Kuoh 1992) ..... *C. testacea* (Kuoh)

Cyrta hirsuta Melichar (Fig. 1)

Cyrta hirsuta Melichar, 1902: 136–137 (61–62), pl. V, Figs 10, 10a–b

Description. Body length: ♂, 6.5mm. Body colour generally dark brown; vertex with blackish brown apically (Fig. 1A); face pale yellow, anteclypeus with pair of stout brown setae apically (Fig. 1B). Head and thorax with somewhat dense pale short setae. Scutellum with some short tufts of black setae laterally (Fig. 1A).

Male pygofer with distal margin broadly rounded in lateral view (Fig. 1D); subgenital plate slightly extending beyond apex of pygofer side, apex acute in ventral view (Figs 1D, G). Aedeagal shaft with dense tubercles laterally, apex strongly narrowed distally in ventral view (Figs 1C, F, L). Xth segment moderately long (Fig. 1I).

Material examined. Syntype, CHINA: 1♂ (MMB), Sichuan Prov., 12. VI. 93, Collection Dr. L. Melichar.

Remarks. This species was originally recorded from three specimens (syntypes) in the following way: 'West-China : Sze'-Chuan, Ta-tsien-lu, 2.VI.93, 3♂ von POTANIN gesammelt.'. The male genitalia of this species are figured here for the first time.

Cyrta hornei (Distant) comb. n. (Figs 2–4)

Placidus hornei Distant, 1908: 342, Fig. 218; Zhang & Wei, 2002: 65, Fig. 1

Description. Body length: ♂, 7.4mm; ♀, 9.7–10.0mm. Head and thorax generally black, vertex with brown basally laterally, gena and anteclypeus generally brown, anteclypeus with pair of black spots apically. Pronotum brown laterally. Scutellum with some short tufts of setae laterally.

Male pygofer with distal margin broadly rounded in lateral view (Fig. 3A); subgenital plate slightly extending beyond apex of pygofer side, apex acute in ventral view (Fig. 3C). Aedeagal shaft bifurcate apically in dorsal view (Fig. 3E). Xth segment elongate (Fig. 3B).

Female genital capsule with apex acute, with dense short to long setae (Fig. 4A).

Material examined. INDIA: Holotype ♂ (BMNH), N.W. Provinces of India; 1♀ (BMNH), H.P., Simla, 2133m, 14-X-1979, C.A. Viraktamath ; 1♀ (BMNH), Punjab, Murree, Hills., Thobba, H. Roberts; NEPAL: 1♀ (BMNH), Nepal Dept. Ag.

Remarks. This species was erected as the type species of *Placidus*, but there has been some confusion regarding its identity (see Discussion below). In the present paper we take the identity of *hornei* (and that of genus *Placidus*) from its unique type and recognize *Placidus* as a junior synonym of *Cyrta*. We also establish that the figures of *P. hornei* by Evans (1971) are of a different species which is similar to *P. incurvatus* Wei & Zhang. As Zhang & Wei (2002) figured only the aedeagus, style and connective of the holotype, and reproduced the figure of genital capsule by Evans (1971), we take the opportunity to figure the male genital capsule of the holotype for the first time in this paper (Figs 3A–C).

Cyrta incurvata (Wei & Zhang) comb. n.

Placidus incurvatus Wei & Zhang, 2003: 91, Figs 1–7

Remarks. This species is very similar to the species which was figured by Evans (1971) as *Placidus hornei* Distant in having the elongate male pygofer and the large inner bifurcate process. It can be distinguished from the latter and other species of the genus by the colour pattern on the head and shape of both the style and male valve.

Cyrta longiprocessa (Li & Zhang) comb. n.

Placidus longiprocessus Li & Zhang, 2007: 148–149, Fig. 4

Remarks. According to the description and the figures of Li *et al* (2007), this species is similar to *C. furcata* (Li et Zhang), but can be distinguished from the latter and other species by the very long paired lateral processes arising from the basal part of its aedeagus.

Cyrta longwanshensis (Li & Zhang) comb. n.

Placidus longwanshensis Li & Zhang, 2006: 155, Figs 18–25

Remarks. According to the description and the figures of Li & Zhang (2006), this species is similar to *C. brunnea* (Kuoh), but can be distinguished from the latter by the colour pattern of the head and the shape of

aedeagus. However, the aedeagus figured by Li & Zhang (2006) seems to be damaged.

Cyrta orientalis (Schumacher) comb. n. (Fig. 5)

Placidus orientalis Schumacher 1915: 104

Description. Body length: ♂, 7.8–8.0 mm; ♀, 8.1mm. Body colour generally brown; vertex darker apically (Fig. 5E); anteclypeus with pair of stout setae apically (Fig. 5D); pronotum dark on disc, posterior margin angularly incurved; scutellum with very long tufts of black hairlike setae laterally (Fig. 5E).

Male pygofer with dorsal margin straight in lateral view (Fig. 5C). Valve subtriangular, broadened basally; subgenital plate much shorter than pygofer side (Fig. 5F); outer basal arm of style very strong (Fig. 5B). Aedeagal shaft tapered to apex, a process on each side apically strongly curved ventrally in lateral view (Fig. 5G), margin between processes nearly trucate in ventral view (Fig.5A).

Material examined. CHINA, Taiwan: 1♀ (ZSU), Horl (Pull. Polisia), Taichong, Distr. 800m, Met., 22–VIII-(19)47, L. Gressitt; 1♂ (NWAFU), Nantou, Nanshan Chi, T. Endo Leg., 5-V-1982, M. Hayashi; 1♂, 1♀ (INHS), Taichung, Gu Kang, Tai Dian Rd. Ca. 1km S. Rt.8, 1000m, 24°12´ 24´´N, 121° 1´27´´E, 26-VI-2004, sweeping, C.H. Dietrich.

Remarks. The male genitalia of this species are examined and figured here for the first time.

Cyrta tiantaishanensis sp. n. (Fig. 6)

Description. Body length: ♂ 7.5–7.7mm. Body generally black; vertex with brown laterally near eyes; gena, lora and anteclypeus with brown patches; anteclypeus with pair of stout setae apically; scutellem with short tufts of black setae basally near lateral margin (Figs 6B, C).

Male pygofer with subgenital plate extending nearly to apex of pygofer side (Fig. 6G). Aedeagal shaft evenly tapered to acute apex in lateral view, slightly expanded subapically and narrowly rounded in ventral view, with dense small tubercles on distal half laterally; gonopore apical (Figs 6D, E).

Type material. Holotype. ♂ (NWAFU), CHINA: Shasnxi Prov., Feng Co., Tiantaishan, 2000m, 9-VI-1998, Yang Linghuan. Paratype: 1♂ (NWAFU), same data as holotype.

Etymology. Named after the type locality.

Remarks. This new species is similar to *C. hirsuta* Melichar, but can be distinguished from it by: 1) the black patch on vertex extending from posterior margin to anterior margin of vertex (Fig. 6C); 2) lora bicoloured (black and brown) (Fig. 6A); 3) aedeagal shaft evenly tapered to acute apex in lateral view, slightly expanded subapically and narrowly rounded in ventral view, with dense small tubercles on distal half laterally.

Cyrta spinosa sp. n. (Fig. 7)

Description. Body length: ♂, 7.8mm. Body colour generally dark brown to blackish brown. Anteclypeus with pair of black spots and stout setae apically (Fig. 7A); vertex distincly concave medially forming a weak ridge near apical margin in dorsal lview (Fig. 7B). Head and thorax with short yellow setae; scutellum with very long tufts of yellow hairlike setae basally and black hairlike setae apically (Fig. 7B).

Male pygofer rounded distally, with very dense short to long macrosetae and very short setae (Fig. 7C). Valve broad basally, angularly developed distally; subgenital plate extending not beyond to apex of pygofer side, with dense setae from base to apex (Fig. 7D). Aedeagus very boad subbasally in both lateral and ventral view; shaft with several stout lateral spines (Figs 7E, G).

Type material. Holotype: ♂ (TJHM), CHINA: Hubei Prov., Fang Co., 15-VI-1977, Liu Shengli.

Etymology. The name of this species is derived from the spines on the aedeagus.

Remarks. This species can be distinguished from all other species of the genus by its unique aedeagus which is very broad subbasally in both lateral and ventral view with several lateral spines on the shaft (Figs 7 E, G).

Cyrta condupulicata sp. n. (Fig. 8)

Description. Body length: ♂ 6.4mm. Body colour generally brown; vertex with black apically and over medial line, a pair of blackish brown elongate spots situated subbasally (Fig. 8B); frontoclypeus and lora darker; anteclypeus with pair of stout setae apically (Fig. 8E). Pronotum darker on disc; thorax with somewhat dense short white setae; tufts of hairlike setae on scutellum very long, brown to black (Fig. 8B).

Male genital capsule with short to long macrosetae and very short setae; subgenital plate extending nearly to apex of pygofer side (Fig. 8G). Aedeagal shaft with lateral margin serrate, double layered medially, apex distinctively incised medially in ventral view (Figs 8C, D).

Type material. Holotype: ♂ (NWAFU), E. MALAYSIA, SABAH: Tinanamantawaram (Ca 1000m), nr. Poling, 18-VI-1983, S. Nagai leg, Coll. M. Hayashi.

Etymology. The specific name is derived from the conduplicate aedeagal shaft.

Remarks. This species can be distinguished from other species of this genus by its unique aedeagal shaft which is double layered medially with its lateral margin serrate and its apex distinctively incised medially in ventral view (Figs 8C, D).

Cyrta coalita sp. n. (Fig. 9)

Description. Body length: ♂ 8.0mm. Body colour generally brown to dark brown; anteclypeus and lora dark with pair of stout setae apically on anteclypeus (Fig. 9B). Scutellum with very short tufts of black hairlike setae on lateral margin (Fig. 9A).

Male pygofer with short to long macrosetae and very dense short setae; with a long dorsally curved inner process and process with two denticles on dorsal margin at about one third part (Fig. 9G). Subgenital plate not extending beyond to apex of pygofer side; fused with valve basally (Fig. 9F). Aedeagal shaft broad basally and tapered to apex in both lateral and ventral view, apex acute in lateral view and narrowly rounded in ventral view (Figs 9C, E).

Type material. Holotype: ♂ (ZSU), CHINA: Yunnan Prov., Western Hills, near Kunming, 6-VII-(19)40, J. L . Gressit.

Etymology. The specific name is derived from its subgenital plates fused to valve basally.

Remarks. This species is similar to *C. striolata*, *C. flosifronta*, *C. incurvata* and *C. fujianensis* in having an inner pygofer process. It can be distinguished from these by: 1) subgenital plate acute apically and fused to valve basally; 2) inner process of pygofer with two denticles on dorsal margin at about one third part; 3) aedeagal shaft broad basally and tapered to apex in both lateral and ventral view, apex acute in lateral view and narrowly rounded in ventral view.

Cyrta fujianensis sp. n. (Fig. 10)

Description. Body length: ♂ 6.5mm; ♀7.1–7.5mm. Body colour generally pale yellow; face face with distal

area of frontoclypeus, anteclypeus, lora and distal area of gena dark brown; anteclypeus with pair of stout setae apically (Fig. 10C). Pronotum with disc darker; scutellum with a dark upside-down Y-shaped mark and long yellowish white tufts of hairlike setae (Fig. 10D).

Male pygofer with dorsal margin somewhat straight; a long inner process curved dorsally, tapering to apex (Fig. 10G). Subgenital plate not extending beyond to apex of pygofer side; fused with valve basally, apex rounded in ventral ventral view (Figs 10F, G). Aedeagal shaft broad basally and evenly tapered to rounded apex in lateral view (Fig. 10B), narrow in ventral view (Fig. 10E).

Type material. Holotype: ♂ (NKU), CHINA: Fujian Prov., Nanjing Co., 4-V-1965, Wang Liangchen. Paratypes, CHINA, Fujian Prov., Dehua Co.: 1♀ (SHEM), 26-IV-1962, Jin Gentao; 1♀ (CAU), 6-XI-1974.

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

Remarks. This species is similar to *C. striolata*, *C. flosifronta*, *C. incurvata* and *C. coalita* in having an inner pygofer process. It can be distinguished from these by: 1) subgenital plate roundly convex apically and fused to valve basally; 2) aedeagal shaft broad basally and evenly tapered to rounded apex in lateral view, narrow in ventral view.

Cyrta sp.

Placidus hornei Distant, Evans (1971), misidentification.

Remarks. The species examined and figured by Evans (1971) as *Placidus hornei* Distant is found to be a different species, similar to *C. incurvatus* Wei & Zhang (see Discussion).

Cyrta spp.

Material examined. CHINA: 1♀ (CAU), Anhui Prov., Huangshan, Yunjisi, 22-VII-1977, Yang Jikun; 1♀ (BMNH), Foochow, 1937–38, M.S. Yang.

Remarks. The identity of the above two females, that differ from each other and from other species of the genus in external appearence, needs to be investigated further when more material, especially associated males, become available in the future.

Paracyrta gen. n.

Type species: *Cyrta blattina* Jacobi

Diagnosis. This new genus is similar to *Cyrta* Melichar, but can be distinguished from the latter by the distinctively bicoloured pronotum, the absence of tufts of hairlike setae on the scutellum, the distinctively short setae on the fore tibia (Fig. 11D), the more elongate male pygofer with dorsal margin straight (Fig. 11 I), and the shorter apical extension of the style apical process (Fig. 12G).

Description. Pronotum with disc very dark, lateral area pale brown or dark yellow.

Head small, distinctly narrower than pronotum. Vertex shorter than width between eyes; anterior margin rounded, sloping to front; posterior margin slightly concave; coronal suture distinct, extending nearly to anterior margin. Ocelli on vertex, near anterior margin, situated approximately their own diameters from corresponding eye. Face similar in length to width; lateral frontal suture extending well beyond corresponding ocellus; transclypeal suture absent. Anteclypeus broadening apically, apical margin slightly convex, with or without paired stout setae apically; gena flat; lora broad. Rostrum long, about two thirds length of anteclypeus; labrum about two thirds length of labium. Antenna about as long as body, arising adjacent to mid-

point of inner margin of eye; antennal ledge indistinct; antennal pit shallow. Pronotum about 2~2.5X broader than median length; posterior margin concave; lateral margin long with carina present, curved to eye anteriorly. Scutellum length about equal to pronotum; basal width similar to width of head; transversal depression somewhat indistinct; posterior half weakly elevated and inclined from transverse suture; posterolateral ledge indistinct. Forewing with five apical cells; middle and outer subapical cells closed, inner subapical cell open; claval veins connected by crossvein to each other and to claval suture; appendix broad with margin rounded, extended to fourth apical cell; claval margin strongly elevated and crimped at apex. Hind wing venation complete.

Legs densely setose. Fore femur with setae short to long: anterior surface with IC setae difficult to distinguish from AM and AV setae (Fig. 11A); dorsal surface with dense setae from base to apex, irregularly arranged (Fig. 11B); ventral surface with setae short, somewhat irregularly arranged (Fig. 11C). Foretibia with setae very short; AD and PD seta somewhat irregularly arranged (Figs 11D, E, F). Hind femur slightly broadened distally, with several distal setae elevated on strong bases and dense short setae subbasally (Fig. 11G). Hind tibia flattened and slightly bowed; several supernumeral setae present between AD and PD rows; PD setae very long (Fig. 11H).

Male pygofer side distinctly elongate, with macrosetae near dorsal and distal margin; dorsal margin nearly straight; distal margin narrowly rounded (Fig. 11I); posterior interconnecting membrane with weakly developed sclerotised areas comprising a long medial area (dorsal connective) between dorsal apodeme of aedeagus and Xth segment (Figs 12D, F). Valve large, posterior margin roundly or angularly produced apically in ventral view; subgenital plate subtriangular, much shorter than pygofer, several short setae on ventral surface (Fig. 12B). Connective somewhat T-shaped, stem long, well sclerotised medially, membranous laterally; arms strong. Style with inner basal arm short, outer basal arm elongate; preapical lobe well developed with several setae adjacent to apical process; apical process moderately long, extending to midpoint of stem of connective, densely crenulate, abruptly expanded subbsally, thereafter evenly tapered to near apex, apex thin and sharply turned medially (Fig. 12G). Aedeagus simple, shaft elongate in lateral view with pair of short apical processes; basal apodeme well developed, connected with dorsal connective; gonopore apical (Figs 12E, F). Xth segment large, elongate (Figs 11I, 12A, C).

Female 7th sternite much longer than 6th sternite, with posterior margin roundly convex laterally, distinctively concave medially (Fig. 13E). Female pygofer with ventroposterior margin slightly incurved (Fig. 13A). First valvulae sculpture comprising striations, aligned longitudinally basally and oblique distally, scale-like sculpture ventroapically (Fig. 13B). Second valvulae with blade-like area extending over distal half, with teeth somewhat fine and dorsal surface of teeth finely serrate, dorsal sclerotised and hyaline areas present (Fig. 13C). Third valvulae with expanded distal region extending over distal half (Fig. 13D).

Distribution. Southern China, Nepal, Vietnam and Thailand (see *Paracyrta* spp. below).

Remarks. Jacobi (1944) described *Cyrta blattina*, based on a single female (originally stated as male). However, a newly found male that matches the type of *blattina* and is from the same locality (Fukien, Fujian Prov.), has several differences from *Cyrta* (see diagnosis). These differences are considered significant enough to warrant placing this species in a new genus, *Paracyrta* **gen. n.**, described above. In addition, several species described in *Cryta* by Zhang *et al* (2002) are included in the genus. Alhough a key to these species is given by Zhang *et al* (2002), it has proved to be unreliable, and at least some of these species may be the same as *blattina* (see remarks under this species below). Therefore, no further key to species is given in the present paper until more material becomes available to clarify the status of the included species.

Checklist of *Paracyrta* gen. n.

Paracyrta banna (Zhang & Wei 2002: 32, Fig. 4, *Cyrta* (in Zhang, Wei & Sun 2002)), **Comb. n.,** China.

Paracyrta blattina (Jacobi 1944 : 35, *Cyrta*), **Comb. n.,** China.
Paracyrta bicolor (Zhang & Wei 2002: 34, Fig. 8, *Cyrta* (in Zhang, Wei & Sun 2002)), **Comb. n.,** China.
Paracyrta bimaculata (Zhang & Sun 2002: 38, Fig. 8, *Cyrta* (in Zhang, Wei & Sun 2002)), **Comb. n.,** China.
Paracyrta dentata (Zhang & Wei 2002: 37, Fig. 7, *Cyrta* (in Zhang, Wei & Sun 2002)), **Comb. n.,** China.
Paracyrta longiloba (Zhang & Wei 2002: 35, Fig. 6 *Cyrta* (in Zhang, Wei & Sun 2002)), **Comb. n.,** China.
Paracyrta parafrons (Zhang & Wei 2002: 39, Fig. 9, *Cyrta* (in Zhang, Wei & Sun 2002)), **Comb. n.,** China.
Paracyrta recusetosa (Zhang & Wei 2002: 30, Fig. 2, *Cyrta* (in Zhang, Wei & Sun 2002)), **Comb. n.,** China.
Paracyrta setosa (Zhang & Sun 2002: 31, Fig. 3, *Cyrta* (in Zhang, Wei & Sun 2002)), **Comb. n.,** China.

Paracyrta blattina (Jacobi) comb. n. (Figs 11–13)

Cyrta blattina Jacobi 1944: 35

Material examined. CHINA, Fukien (Fujian Prov.): Holotype ♀, 21-VII-1937, J. Klapperich (ZFMK) ; Shaowu, 2♀, IV~V-1942; Tachulan, 1♂, 1000m, 7-IV-1942; 2♀, 7-V-1942; 1♀, Kenyang, Masha, 7-VIII-1943 (all T.C. Maa, BPBM).

Remarks. The female holotype of *C. blattina* was originally stated as male. The body lengths (including forewings) of the specimens examined are as follows: ♂ 8.6mm; ♀ 9.6–11.0mm.

A re-examination of the type genitalia of other *Paracyrta* species (known from the male) indicates that their differences may represent variation of a single species (*blattina*). A decision on the status of these species, that show some differences in the shape of male genitalia and in colour, particularly to the abdomen, is deferred until further material is available for study.

Paracyrta spp.

Material examined. CHINA: 1♀ (IRSNB), Yunnan Prov., Mengyang Co., river bed, 5-III-1999, Leg. P. Groothart; 2♀ (MMB), Yunnan Prov., Jizushanm, 25.58°N N100.21°E , 6~10-VII-1994, vit Kubáň, Leg; 1♂ (IZAS), Hainan Prov., 10-III-1959. Jin Gentao; 1♂ (SHEM), Hainan Prov., Qiongzhong, 2-III-1959. Jin Gentao. VIETNAM: 1♀ (MMB), Fyan, 900–1000m, 11-VII~9-VIII-(19)61, N.R. Spencer. THAILAND, Chiangmai Prov.: 1♂ (Bishop), Chiangdao, 450m, 5~11-IV-1958, T.C. Maa; 2♀ (MMB), San Pakia vill., 19.19°N, 98.50°E, 1400m, Vit Kubáň, Leg. NEPAL: 2♂ (MMB), C. Bagmati Zone, Kathmandu vall., Lalitpur dist., Godawari-Phulchoki, 2200–2700m, 1~7-VI-1996, P. Cechovský leg.

Remarks. There is some variation in the above material, particularly with respect to the colour pattern of the abdomen and the apex of the aedeagal shaft. These differences and the identity of these specimens needs to be investigated further when more material becomes available in the future.

Discussion

Identity of Evans's *Placidus hornei*. The previous identity of *Placidus* has been taken from Evans's (1971) genitalia figures of the type species, *hornei* Distant. However, a comparison of Evans's *hornei* aedeagus figures with that of the type specimen (see Zhang & Wei 2002), indicates that Evans did not figure the holotype of *hornei* as might be supposed but a different species, similar to *C. incurvata* (Wei & Zhang). Evans (1971) gave figures of the male cleared genitalia (including the aedeagus) but he did not indicate which specimen of *Placidus* he had figured, only that it was the type species. Although there is type and non-type material

(BMNH and Evans's collection, Australian Museum, respectively) of two other taxa included in the same paper as Evans's *Placidus* figures, i.e., *Placidellus ishiharei* and *Kasinella siamensis*, there is no material identified by him as *hornei* in these collections. Also, among several male specimens of *Placidus* in the BMNH, none bear Evans's characteristic style of dissection, i.e., he routinely stored the cleared and dissected genitalia in balsam on a card attached to the insect pin and the abdomen was discarded (pers. com. M. Fletcher); this situation applies to the types of *Placidellus ishiharei* and *Kasinella siamensis*, noted above. However, we have established that Evans did borrow a specimen of *Placidus* from the BMNH among 62 indetermined Cicadellidae (Loan no. 8517) and which was returned identified as *hornei* in May 1970 (see museum correspondence archive). Therefore, it can only be assumed that this was the specimen figured during the period of the loan, and that it has since been lost.

The aedeagus, style and connective of the type of *hornei* were figured by Zhang & Wei (2002), with remaining structures, i.e., the pygofer and subgenital plate, reproduced from Evans's misidentified figures. The latter structures of the type are given here for the first time. Based on the re-examination of the holotype of *Placidus* and the clarification of identity of Evans's *Placidus hornei*, we recognize *Placidus* as a junior synonym of *Cyrta*.

Relationship. *Cyrta* and *Paracyrta* form a group with other Oriental stegelytrinae genera, i.e., *Daochia* Wei, Zhang & Webb 2006, *Doda* Distant 1908, *Kunasia* Distant 1908, *Pachymetopius* Matsumura 1914, *Paradoxivena* Wei, Zhang & Webb 2006, *Paraplacidellus* Zhang, Wei & Shen 2002, *Placidellus* Evans 1971, *Platyvalvata* Zhang, Wei & Webb 2006, *Stenolora* Zhang, Wei & Webb 2006, *Temburocera* Webb 1999, *Trunchinus* Zhang, Webb & Wei 2007 and *Wyuchiva* Zhang, Wei & Webb 2006, in having the following characters: head distinctly narrower than pronotum with eyes strongly encroaching onto pronotum laterally and relatively more dorsad in relation to pronotal carina in lateral view; lateral frontal suture extending onto the vertex; antennae very long, nearly as long as body length; middle and outer subapical cells of forewing closed, and inner subapical cell open; hind femur with extra subapical setae, elevated and mounted on strong bases; and supernumeral setae present between anterodorsal and anteroventral rows of hind tibia. However, some exceptions to the above are found in *Temburocera* and *Wyuchiva* where the head is as wide as the pronotum and the pronotum without a lateral carina; and in *Daochia* where the lateral frontal suture terminates at the ocellus, the forewing venation is reticulate and the hind femur has apical setae not elevated on strong bases and formula 2+2+1.

Biology. *Cyrta orientalis* (Schumacher) has been recorded on *Fagus* (Fagaceae), and other host plant information for Stegelytrinae includes: *Stegelytra* Mulsant & Rey and *Wadkufia* Linnavuori on oaks (*Quercus*, Fagaceae) and *Pachymetopius decoratus* Matsumura on *Litsea acuminata* (Lauraceae) and shoots of bamboo (Poaceae). In addition, an indet. specimen of *Paracyrta* recorded here, together with some other stegelytrine species (Zhang *et al*. 2006a, 2006b), were collected on an exposed river bed in a rain forest area of China, during the collecting of Diptera by Dr. P. Groothart (IRSNB). This habit, connected to mineral uptake during feeding ('mud-puddling'), is well known in male Lepidoptera (Boggs and Dau, 2004) and has also been recorded in Cicadidae (Boulard, 2006) and Cicadellidae (see review by Rakitov *et al*. 2005). In these groups the aggregations consist of mainly males, and in Cicadellidae some less common groups groups are involved, e.g., Arrugadinae, Phereurhinini, Nioniinae and Neobalinae, and specimens are nearly always males. For one species of *Cyrta* (*brunnea*) a particularly large number of specimens were collected in the type series (133). As these are all male one can only speculate that perhaps they too were engaged in 'mud-puddling' behavior. The above biological information should be valuable for the collection of Stegelytrinae in the future.

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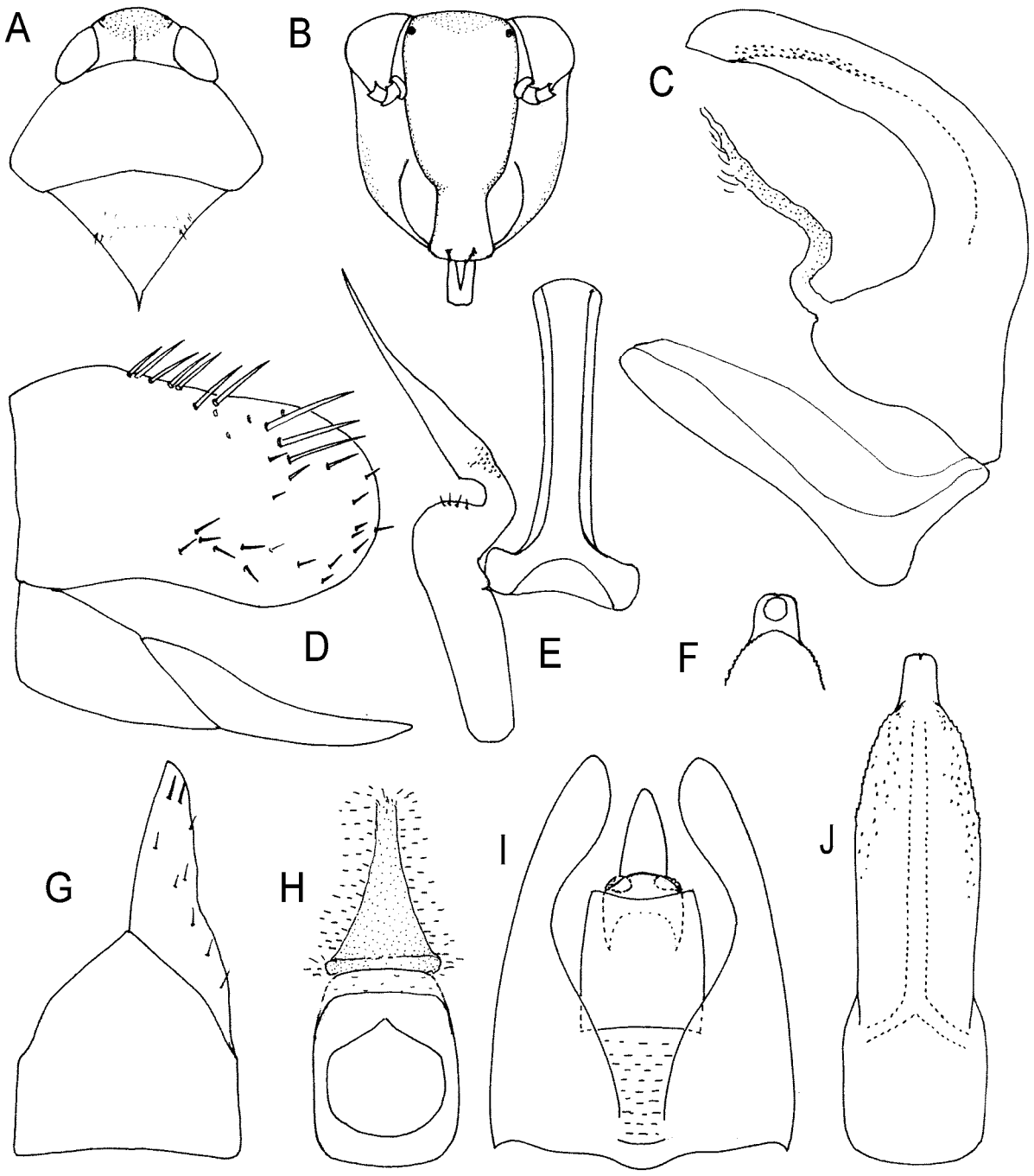

FIGURE 1. *Cyrta hirsuta* A, head and thorax, dorsal view; B, face; C, connective and aedeagus, lateral view; D, male genital capsule, lateral view; E, style and connective, dorsal view; F, apex of aedeagus, ventral view; G, valve and style, ventral view; H, base of aedeagus and dorsal connective, anteroventral view; I, male genital capsule, dorsal view; J, aedeagus, ventral view.

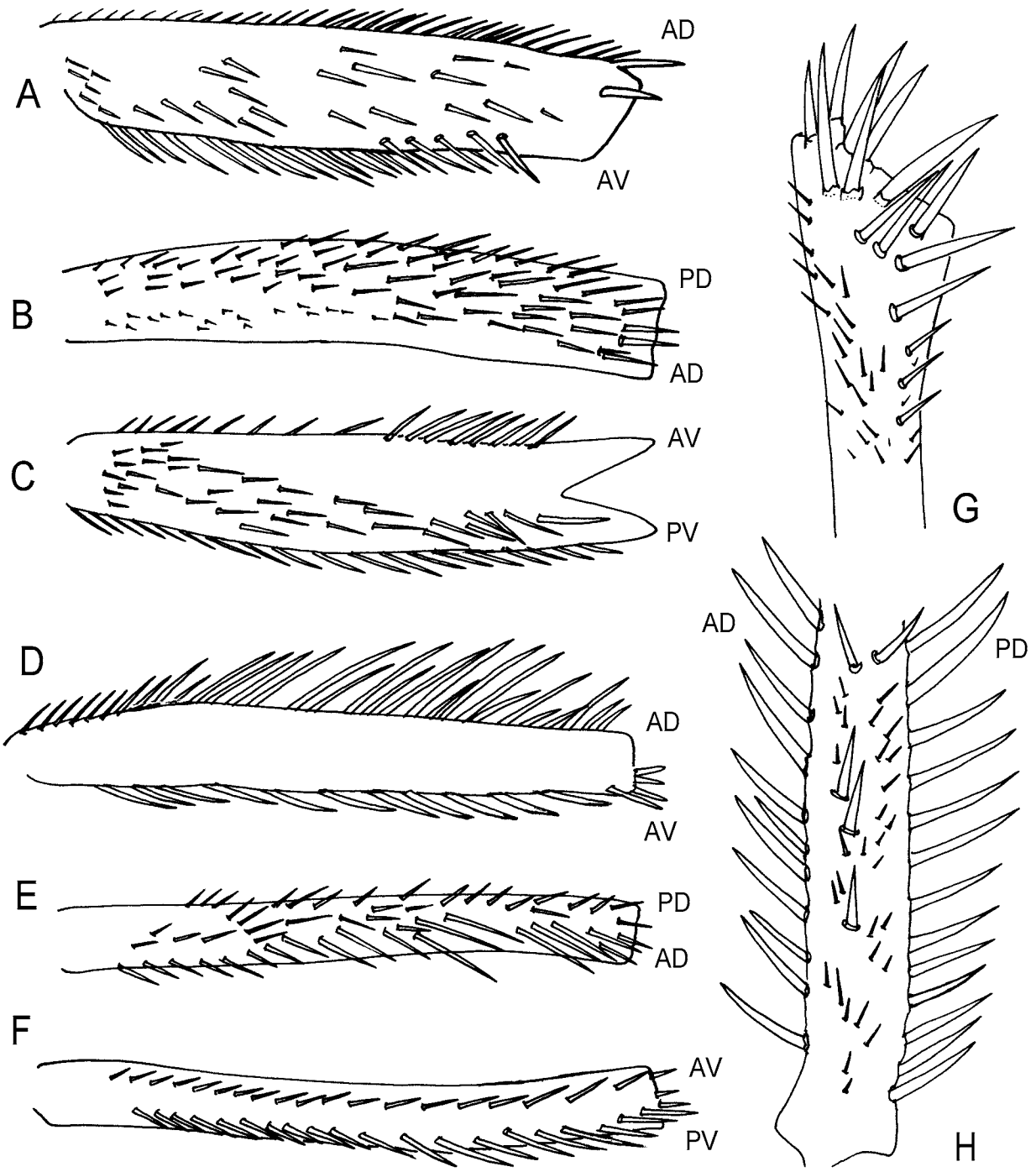

FIGURE 2. *Cyrta hornei* A, fore femur, anterior surface; B, fore femur, dorsal surface; C, fore femur, ventral surface; D, fore tibia, anterior surface; E, fore tibia, dorsal surface; F, fore tibia, ventral surface. G, apex of hind femur, dorsal view; H, base of hind tibia, dorsal surface.

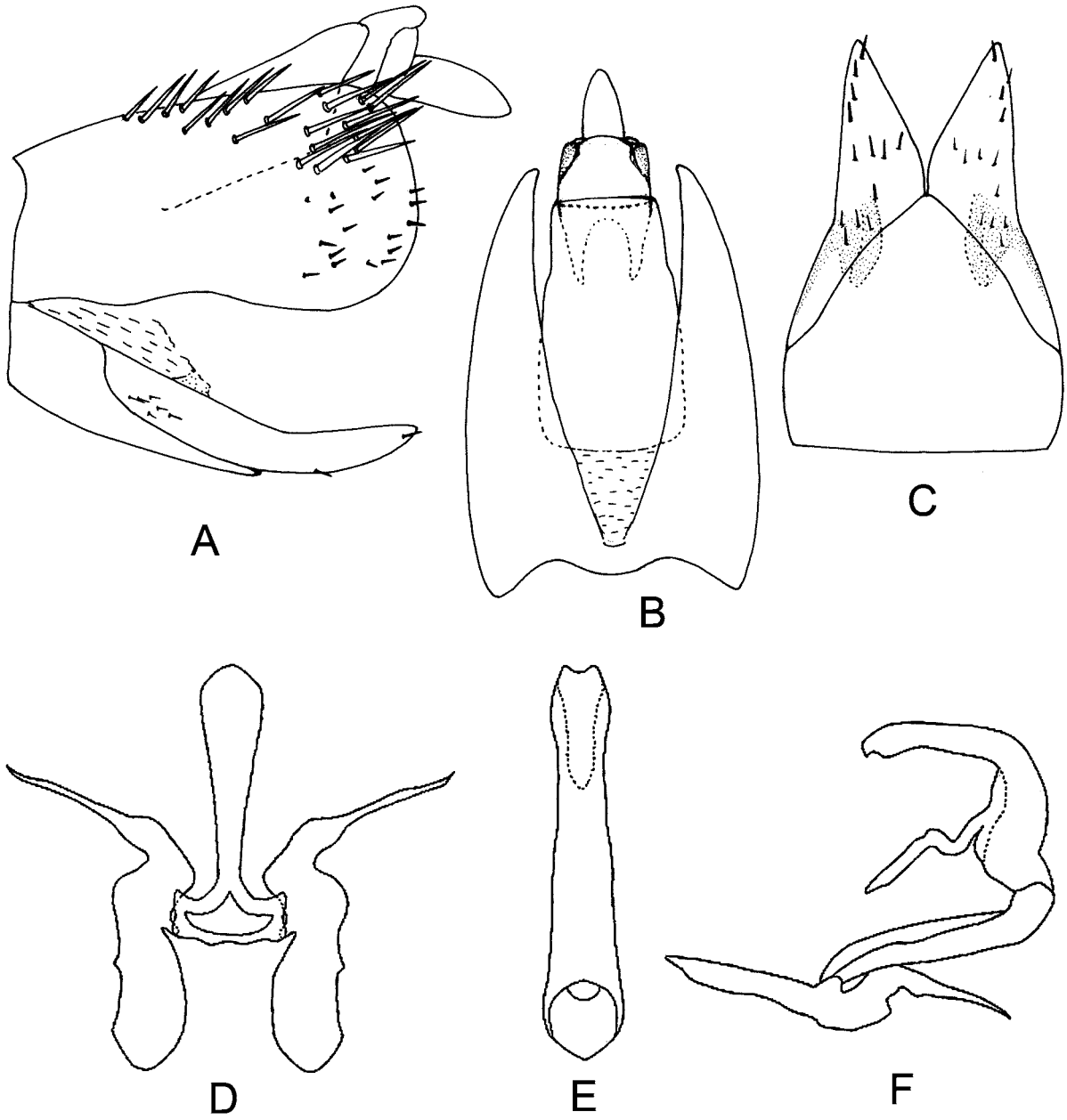

FIGURE 3. *Cyrta hornei*, E-F are after Zhang & Wei (2002). A, male genital capsule, lateral view; B, male genital capsule, dorsal view; C, valve and subgenital plates, ventral view; D, connective and style, dorsal view; E, aedeagus, ventral view; F, style, connective and aedeagus, lateral view.

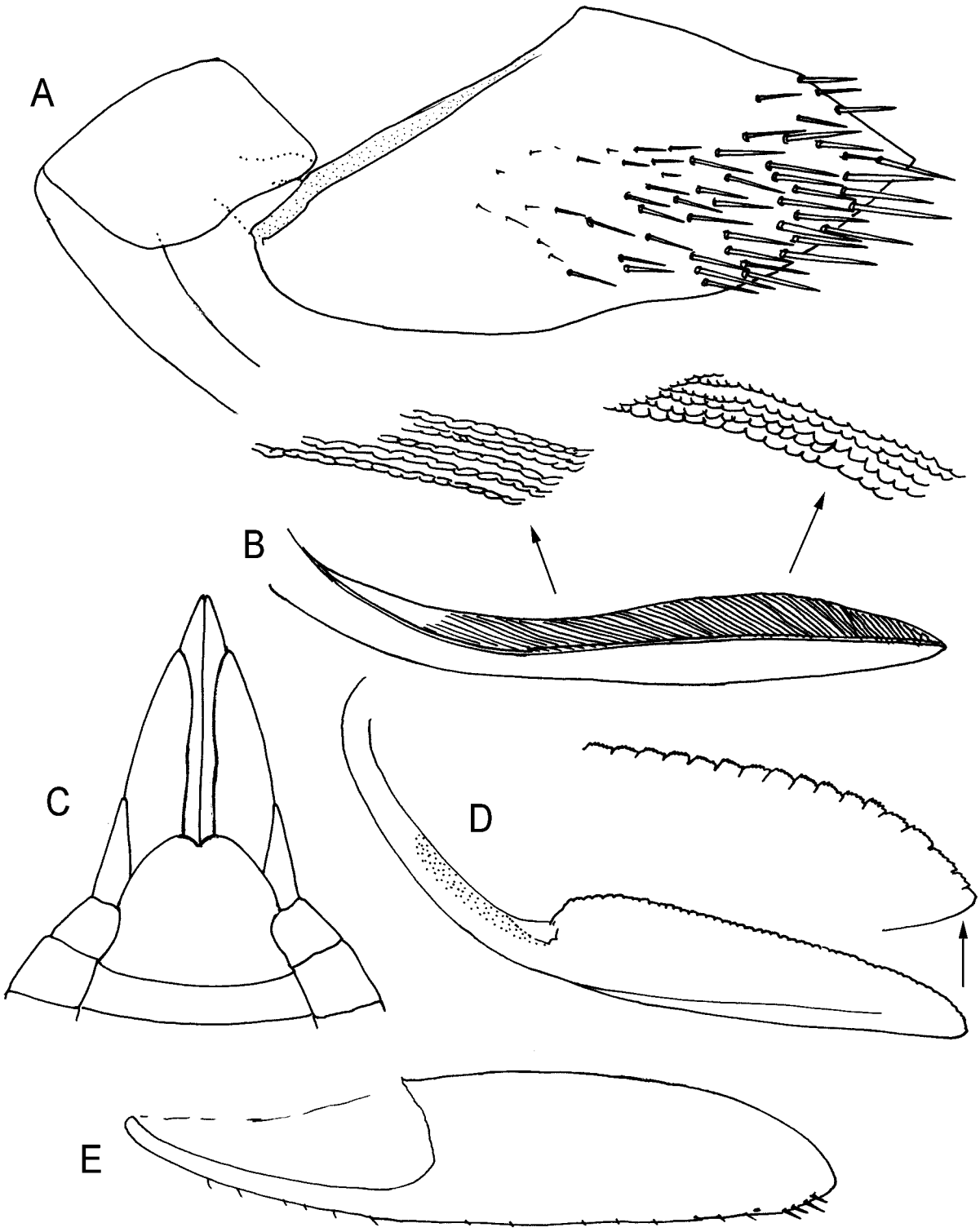

FIGURE 4. *Cyrta hornei* A, female genital capsule, lateral view; B, first valvula and detail of sculptures of first valvula; C, apex of female abdomen, ventral view; D, second valvula and detail of sculptures of second valvula; E, third valvula.

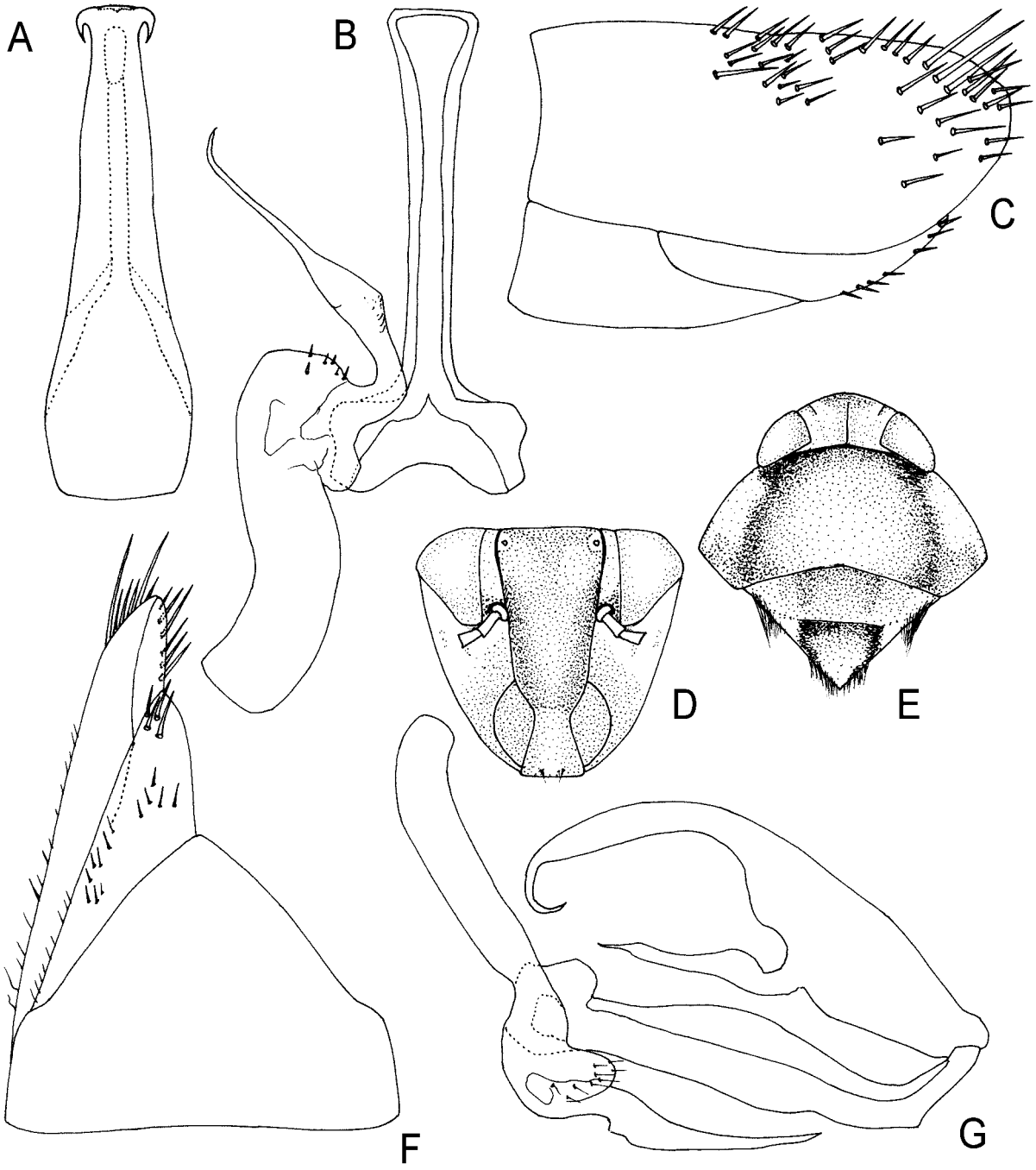

FIGURE 5. *Cyrta orientalis* A, aedeagus, ventral view; B, style and connective, dorsal view; C, male genital capsule, lateral view; D, face; E, head and thorax, dorsal view; F, male genital capsule, ventral view; G, style, connective and aedeagus, lateral view.

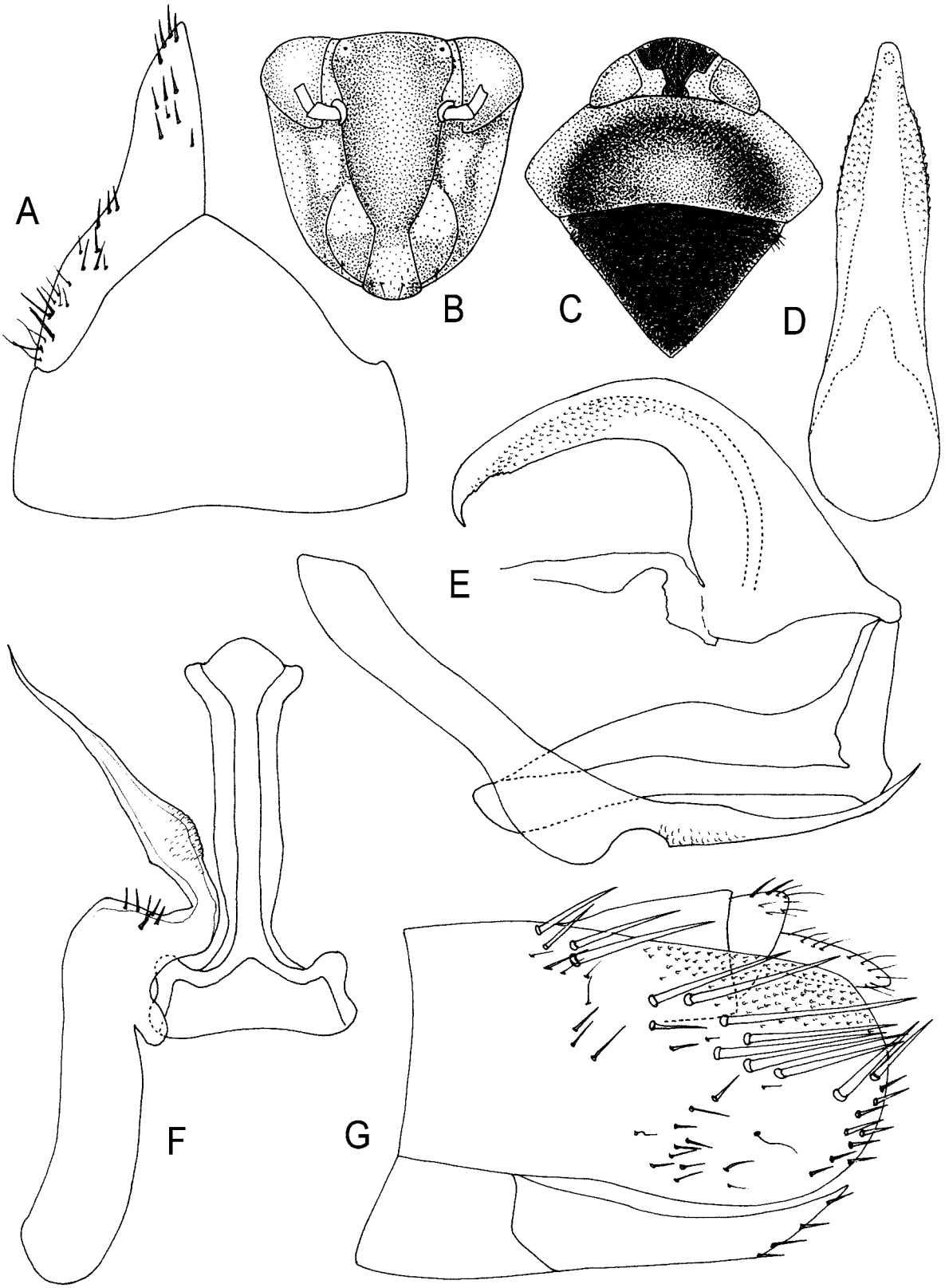

FIGURE 6. *Cyrta tiantaishanensis* **sp. n.** A, valve and subgenital plate, ventral view; B, face; C, head and thorax, dorsal view; D, aedeagus, ventral view; E, style, connective and aedeagus, lateral view; F, style and connective, dorsal view; G, male genital capsule, lateral view.

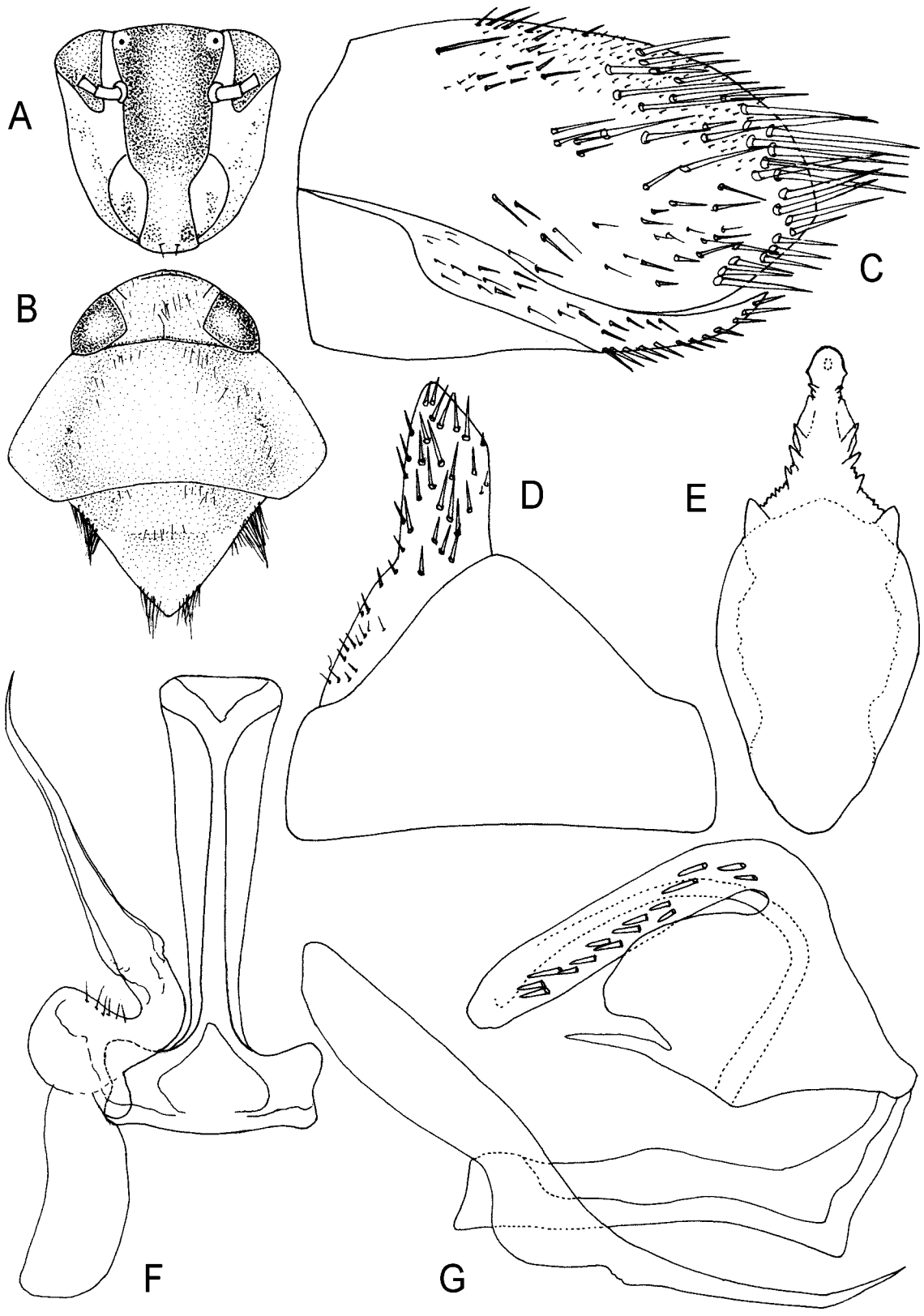

FIGURE 7. *Cyrta spinosa* **sp. n.** A, face; B, head and thorax, dorsal view; C, male genital capsule, lateral view; D, valve and subgenital plate, ventral view; E, aedeagus, ventral view; F, style and connective, dorsal view; G, style, connective and aedeagus, lateral view.

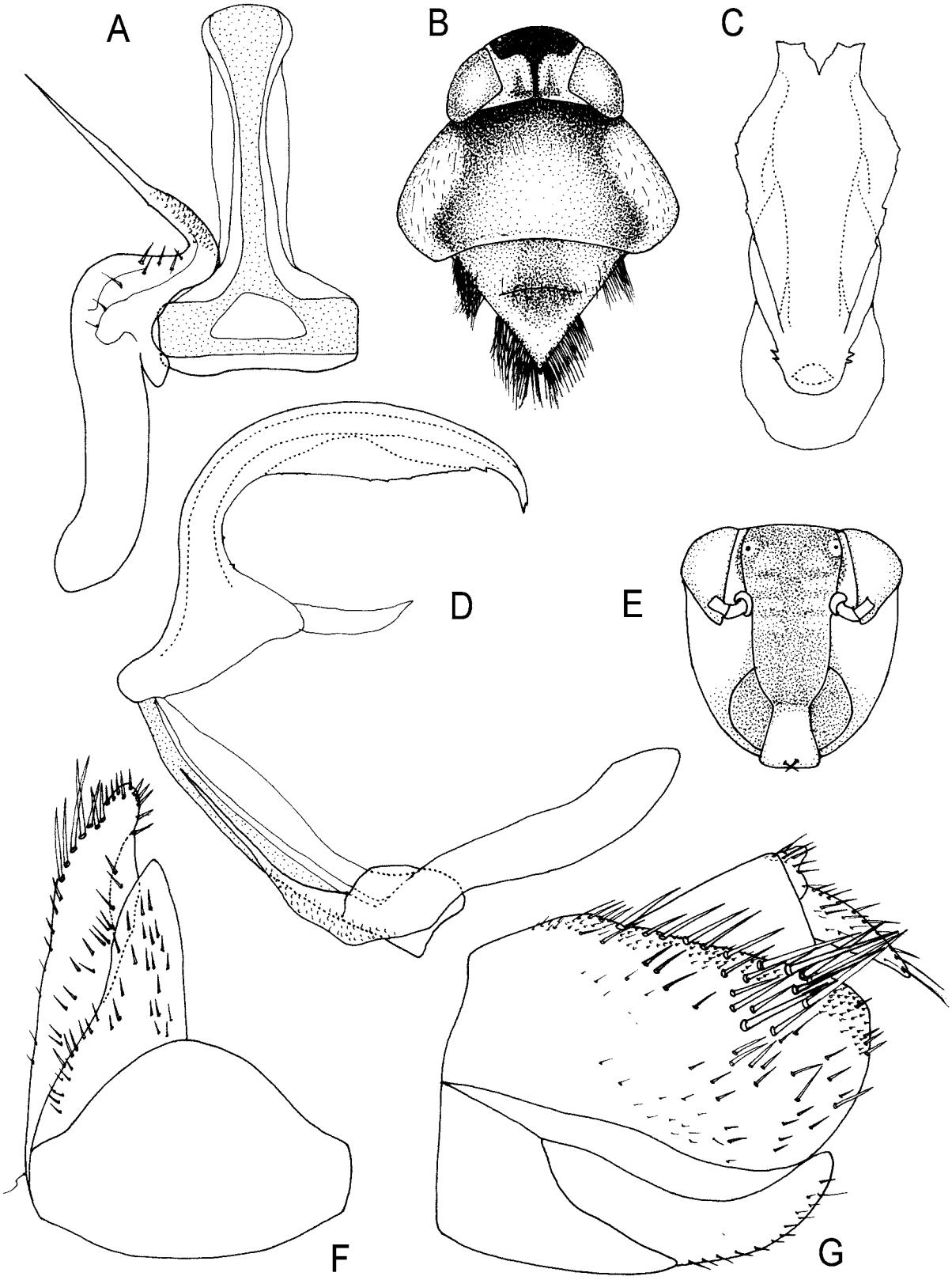

FIGURE 8. *Cyrta conduplicata* **sp. n.** A, style and connective, dorsal view; B, head and thorax, dorsal view; C, aedeagus, ventral view; D, style, connective and aedeagus, lateral view; E, face; F, male genital capsule, ventral view; G, male genital capsule, lateral view.

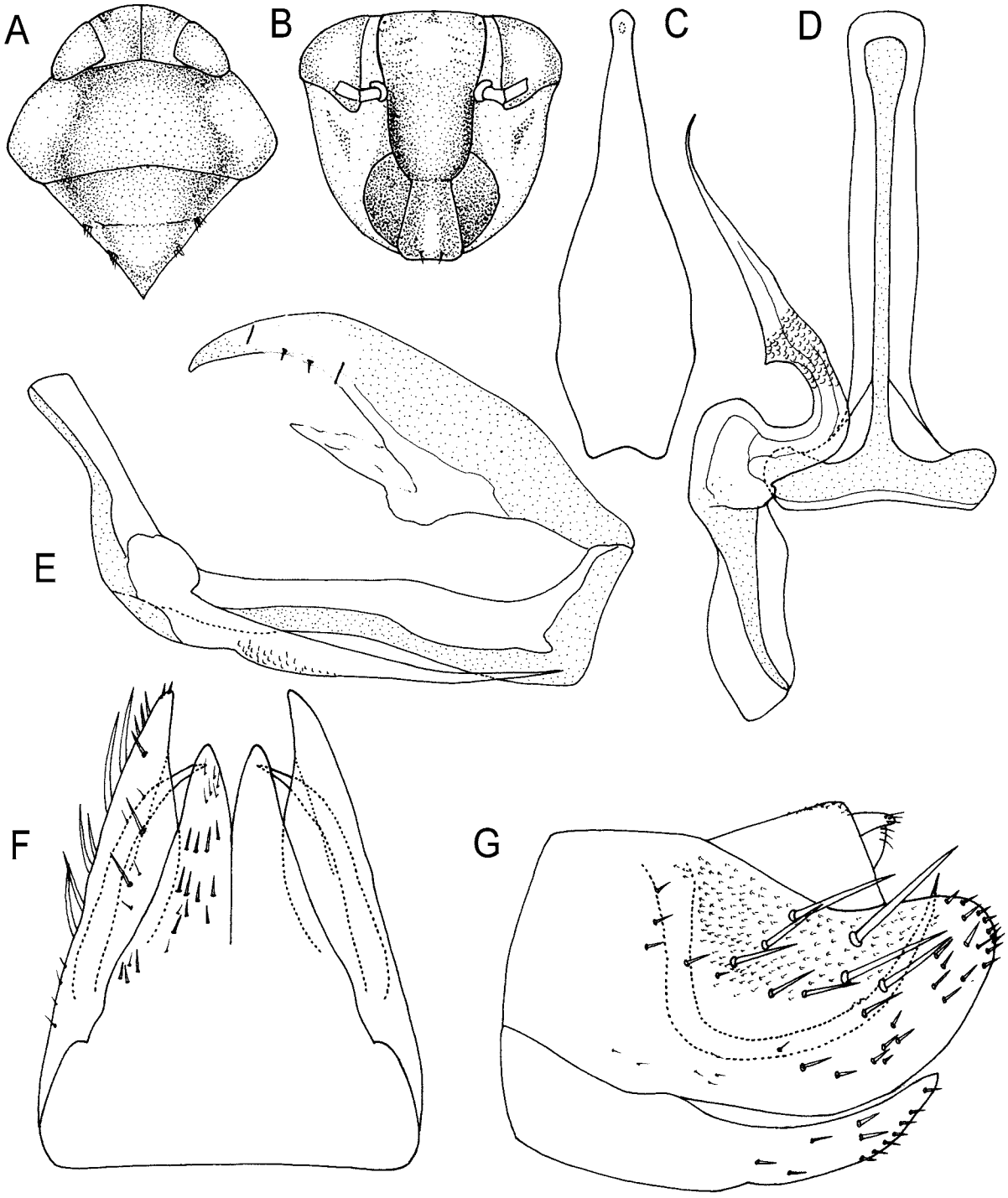

FIGURE 9. *Cyrta coalita* **sp. n.** A, head and thorax, dorsal view; B, face; C, aedeagus, ventral view; D, style and connective, dorsal view; E, style, connective and aedeagus, lateral view; F, male genital capsule, ventral view; G, male genital capsule, lateral view.

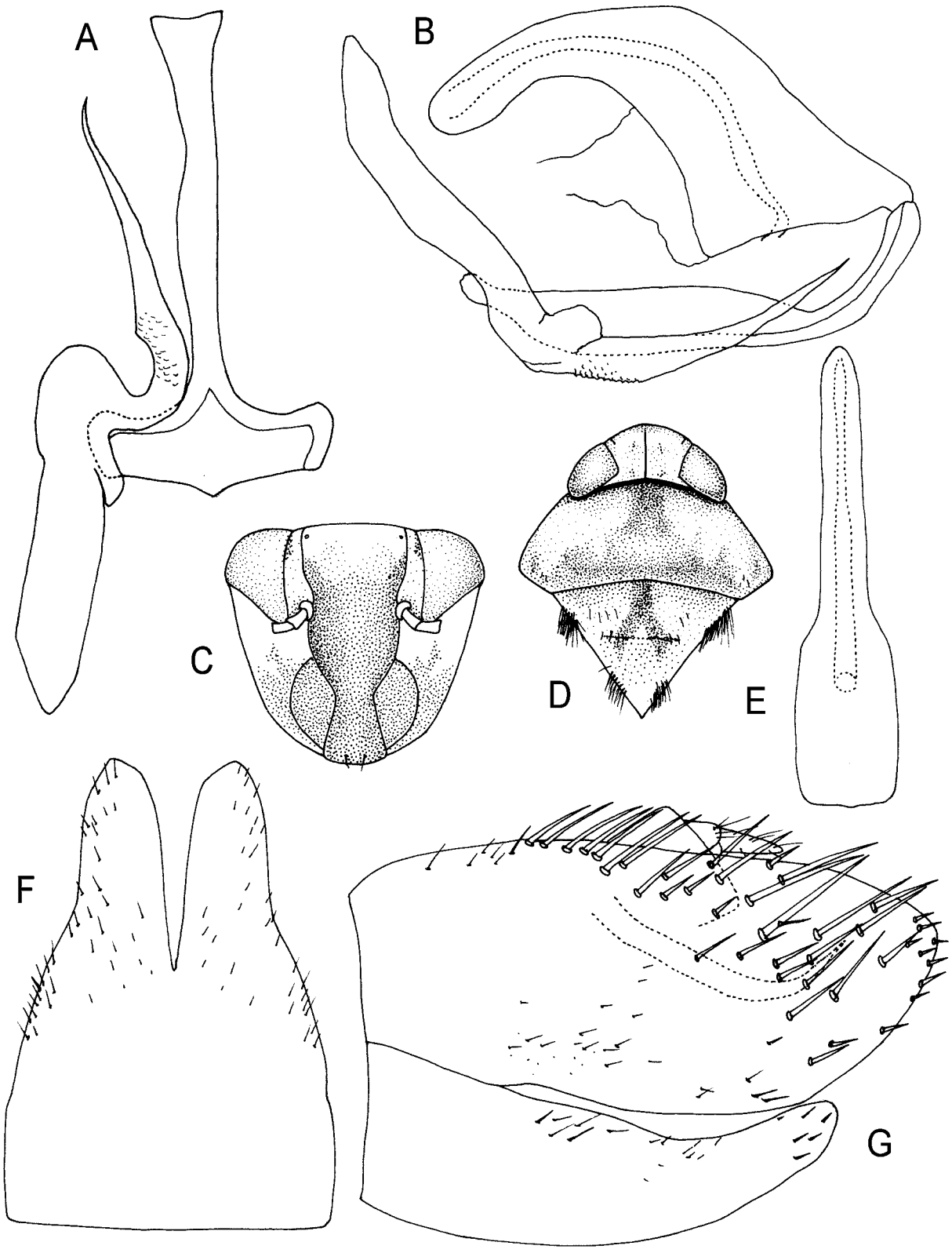

FIGURE 10. *Cyrta fujianensis* **sp. n.** A, style and connective, dorsal view; B, style, connective and aedeagus, lateral view; C, face; D, head and thorax, dorsal view; E, aedeagus, ventral view; F, vale and subgenital plates, ventral view; G, male genital capsule, lateral view.

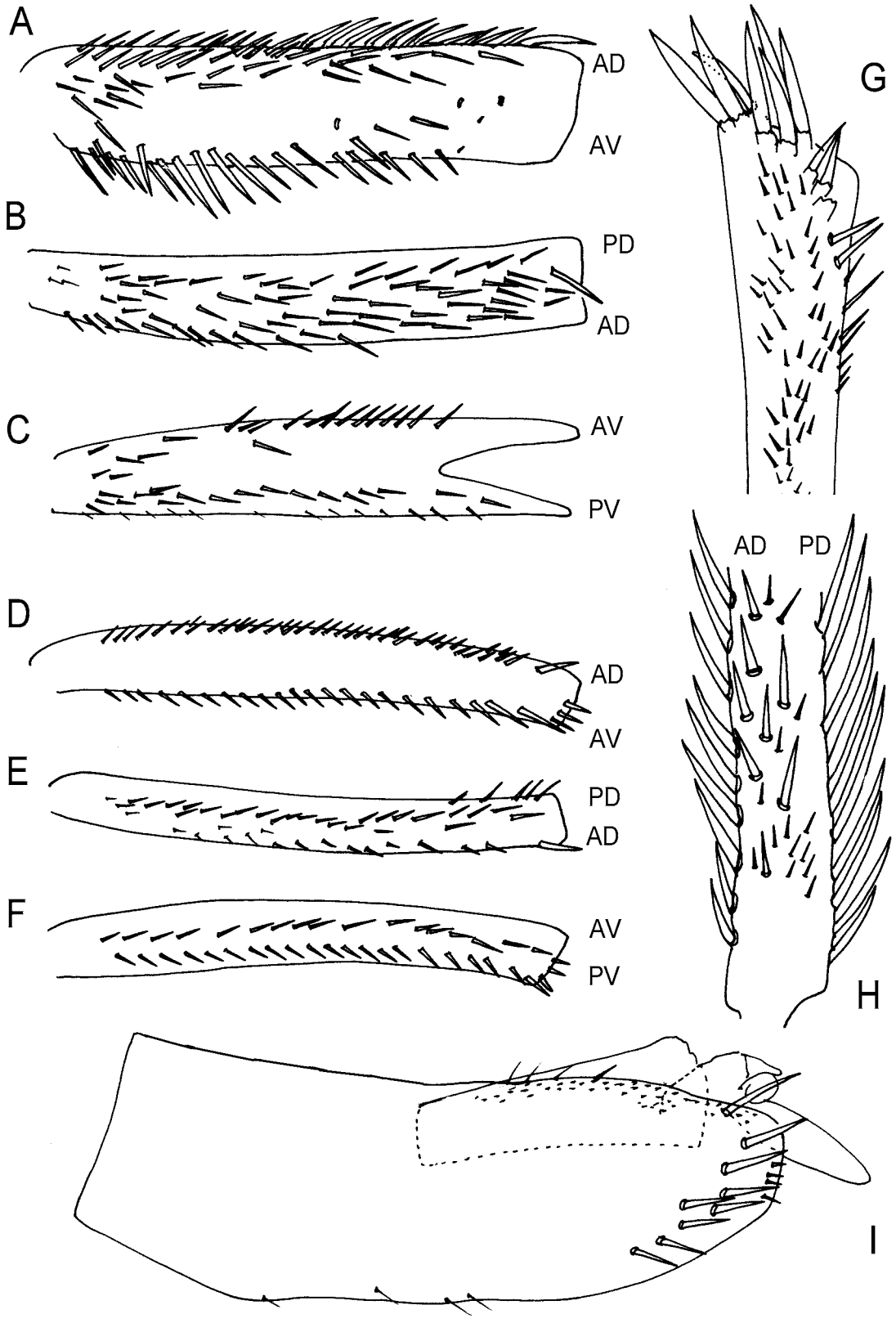

FIGURE 11. *Paracyrta blattina* A, fore femur, anterior surface; B, fore femur, dorsal surface; C, fore femur, ventral surface; D, fore tibia, anterior surface; E, fore tibia, dorsal surface; F, fore tibia, ventral surface. G, apex of hind femur, dorsal view; H, base of hind tibia, dorsal surface; I, male pygofer side, lateral view.

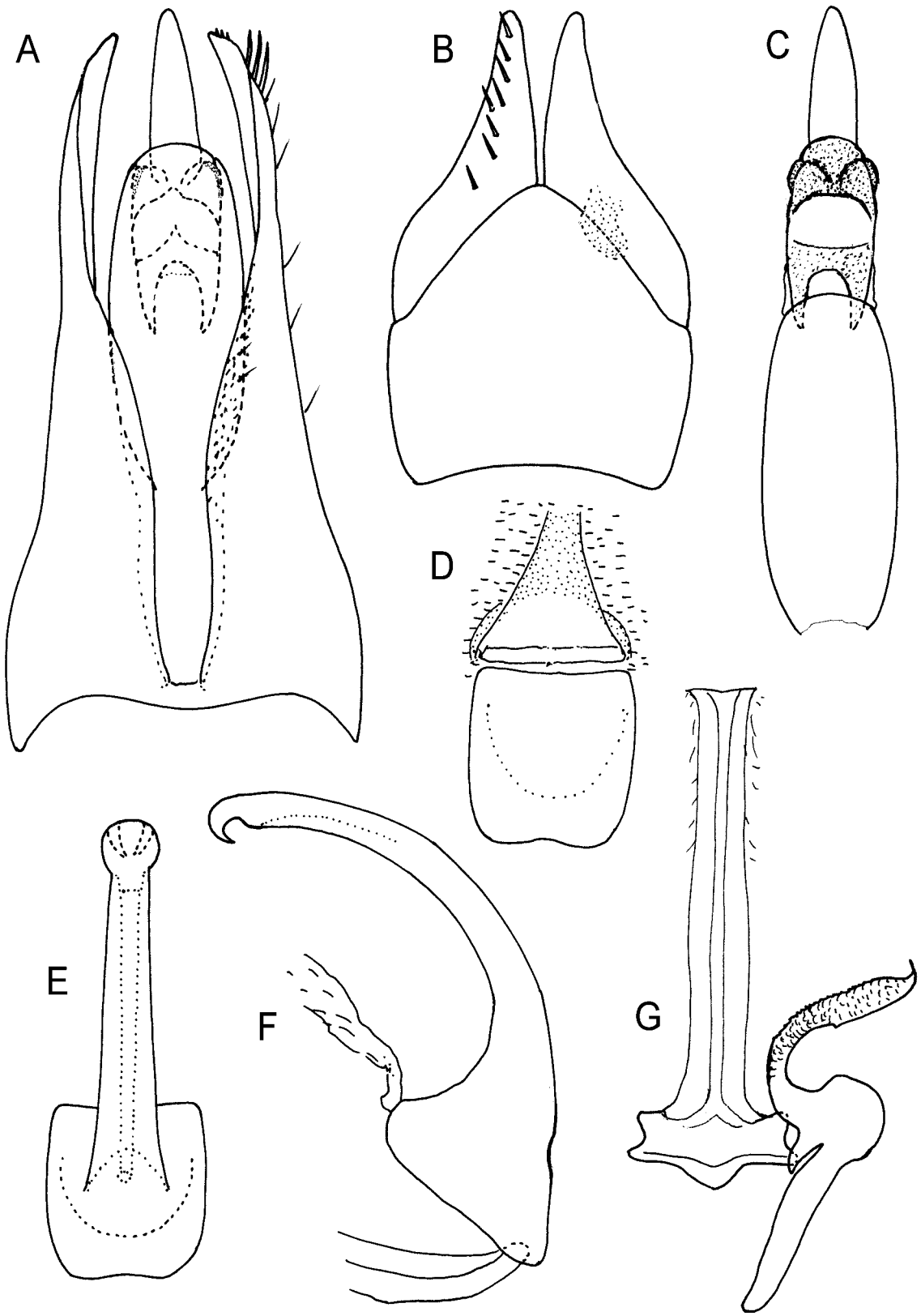

FIGURE 12. *Paracyrta blattina* A, male genital capsule, dorsal view; B, vale and subgenital plates, ventral/dorsal view; C, anal tube (11th segment pulled out), dorsal view; D, base of aedeagus and dorsal connective, anteroventral view; E, aedeagus, ventral view; F, apex of connective and aedeagus, lateral view; G, style and connective, dorsal view.

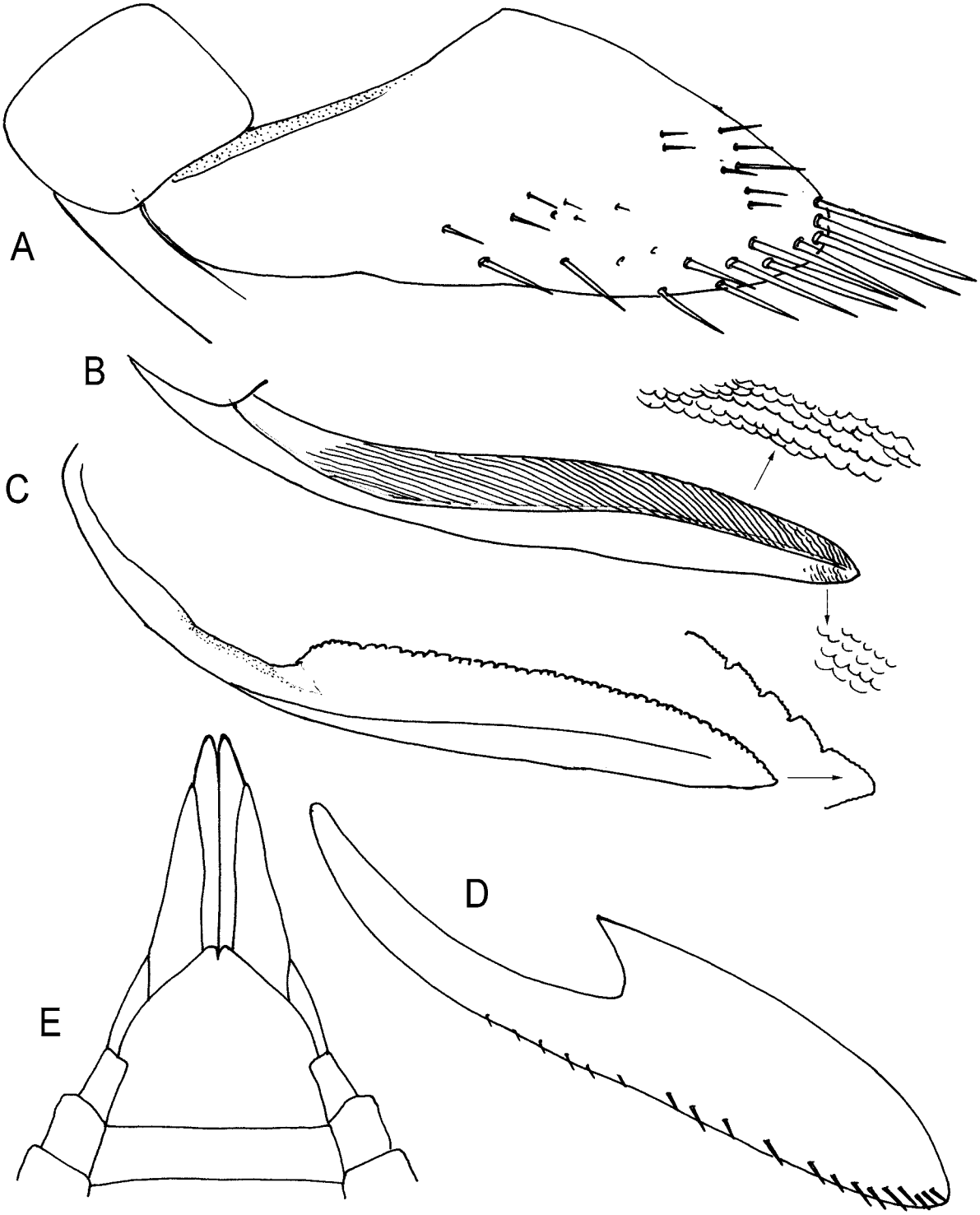

FIGURE 13. *Paracyrta blattina* A, female genital capsule, lateral view; B, first valvula and detail of sculptures of first valvula; C, second valvula and detail of sculptures of second valvula; D, third valvula; E, apex of female abdomen, ventral view.