

**The planthopper genus *Trypetimorpha*:
systematics and phylogenetic relationships
(Hemiptera: Fulgoromorpha: Tropiciduchidae)**

J. HUANG and T. BOURGOIN†*

*Pomological Institute of Shijiazhuang, Agricultural and
Forestry Academy of Sciences of Hebei, 5–7 Street, 050061,
Shijiazhuang, China*

† *Muséum National d'Histoire Naturelle, Laboratoire d'Entomologie,
45 rue Buffon, F-75005, Paris, France*

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The genus *Trypetimorpha* is revised with the eight currently recognized species described or re-described. Four new species are described and seven synonymies are proposed. Within Trypetimorphini *sensu* Fennah (1982), evidences for the monophyly of each genus are selected, but *Caffrommatissus* is transferred to the Cixiopsini. Monophyly of Trypetimorphini, restricted to *Trypetimorpha* and *Ommatissus*, is discussed. A key is given for the following *Trypetimorpha* species: (1) *T. fenestrata* Costa (= *T. pilosa* Horváth, syn. n.); (2) *T. biermani* Dammerman (= *T. biermani* Muir, syn. n.; = *T. china* (Wu), syn. n.; = *T. formosana* Ishihara, syn. n.); (3) *T. japonica* Ishihara (= *T. koreana* Kwon and Lee, syn. n.); (4) *T. canopus* Linnavuori; (5) *T. occidentalis*, sp. n. (= *T. fenestrata* Costa, *sensu* Horváth); (6) *T. aschei*, sp. n., from New Guinea; (7) *T. wilsoni*, sp. n., from Australia; (8) *T. sizhengi*, sp. n., from China and Viet Nam. Study of the type specimens of *T. fenestrata* Costa shows that they are different from *T. fenestrata sensu* Horváth as usually accepted, which one is redescribed here as *T. occidentalis*.

KEYWORDS: Hemiptera, Fulgoromorpha, Tropiciduchidae, *Trypetimorpha*, *Ommatissus*, *Caffrommatissus*, systematics, phylogeny.

Introduction

This revision arose as the result of a study of the Chinese Fulgoromorpha of economic importance (Chou *et al.*, 1985) and the opportunity for J.H. to attend a 1-year training period at the Muséum National d'Histoire Naturelle, Paris. Although *Trypetimorpha* itself has no species of proven economic importance, this study of its systematics and phylogeny is intended as a contribution to the understanding of the group as a whole. Morphological studies on the genus have also been published recently (Bourgoin and Huang, 1990, 1991).

Abbreviations of specimen depositories

Muséum National d'Histoire Naturelle of Paris, France (MNHN); Pomological Institute of Shijiazhuang (Academy of Sciences of Hebei), China (PISC); Institute of

*To whom correspondence should be addressed.

Zoology, Academia Sinica, Beijing, China (IZAC); Beijing Agricultural University, Beijing, China (BAUC); British Museum (Natural History), London, UK (BMNH); Bernice P. Bishop Museum, Hawaii, USA (BPBM); American Museum of Natural History in New York, USA (AMNH); United States National Museum, Washington, DC, USA (USNM); Australian Museum in Sydney, Australia (AMS); Università degli Studi di Napoli, Federico II, Portici, Italy (UNPI); Hungarian Natural History Museum, Budapest, Hungary (HNHM); Rijksmuseum of Natural History, Leiden, The Netherlands (RMNH).

Historical account

The species now placed in *Trypetimorpha* have been described in, or transferred to, a variety of Fulgoromorpha families and genera.

The planthopper genus *Trypetimorpha* was established by Costa (1862) for two species from Italy, *T. fenestrata* and *T. psyllipennis*, which were tentatively placed in the family Cixiidae. The type species, *T. fenestrata*, was fixed later by Oshanin (1912) by subsequent designation, who placed the genus in the Issidae. The Tripetimorphini [*sic*] were first monographed by Melichar (1914: 197), and, with few exceptions, were then definitively placed within the Tropiduchidae.

In 1987, Horváth synonymized the first two described species and later (1907) described a new one, *T. pilosa*, in the Fulgoridae. A few years later, Bierman (1910) recognized three different species from Java in a new tropiduchid genus *Trichoduchus*: *T. media*, *T. hyalina* and one unnamed species, but he died before finishing the work, which was finally completed and published by MacGillavry and Dammerman in 1910, under the name of Bierman. In this work Dammerman, following Bierman, described the third unnamed species: *T. biermani* Dammerman *in* Bierman and considered the first two as only two varieties of the third: *T. biermani* var. *media* Bierman, 1910 and *T. biermani* var. *hyalina* Bierman, 1910. One year after, in a largely overlooked note, Horváth (1911: 338) synonymized *Trichoduchus* with *Trypetimorpha*.

A few years later, although aware of Bierman's 1910 publication (it is likely that he saw the manuscript of Bierman and not the published paper with Dammerman's corrections), Muir (1913: 255) published a new species from China with the same name (junior homonym), *T. biermani* Muir, 1913 [*nec* Dammerman, 1910].

In his 'Monographie der Tropiduchinen', Melichar (1914: 200–202) removed *T. pilosa* to the genus *Trichoduchus* with *T. biermani*, leaving *T. fenestrata* alone in the genus *Trypetimorpha*. He indicated also (1914: 200) the synonymy of *T. biermani* Muir, 1913, with *T. biermani* Dammerman. Unaware of this, Wu (1935) applied the principle of homonymy to Muir's species, renaming it *T. china* (Wu), 1935. Metcalf (1954: 71) followed this taxonomic change, probably because the synonymy proposed by Melichar was not properly mentioned.

Ishihara (1954) placed *Trypetimorpha* in the family Fulgoridae and described two new species: *T. formosana* and *T. japonica*. This last name was also used by Fennah (1955) to describe another *Trichoduchus* species: *T. japonicus* Fennah, 1955.

The first species from Africa, *Trypetimorpha canopus*, was described by Linnavuori (1973). A few years later, Kwon and Lee (1979) described *Trypetimorpha koreana* from Korea.

Finally, in a recent study of the tropiduchid genus *Ommatissus* Fieber, 1872, *Trichoduchus* was synonymized with *Trypetimorpha* by Asche and Wilson (1989). In this paper *Trichoduchus japonicus* Fennah 1955 was synonymized with *Trypetimorpha japonica* Ishihara, 1954.

After a detailed study of male and female genitalia (Bourgoin and Huang, 1990, 1991) and with the addition of other morphological characters, the authors present here a systematic revision of the genus *Trypetimorpha*, synonymizing five of the previously described species and describing four more. After a diagnosis of the genus, an illustrated key is given for male and female specimens before the species description. Main references with synonymies and distribution are also given. Host plants are unfortunately unknown, with the exception of one specimen of *T. biermani* labelled as having been taken on mango in India (Fennah, 1982). In conclusion the phylogeny of the Trypetimorphini and the monophyly of each taxa of tribe *sensu* Fennah (1982): *Trypetimorpha* Costa, *Ommatissus* Fieber and *Caffrommatissus* Fennah, 1967, is discussed.

Tribe TRYPETIMORPHINI

Trypetimorphini Fieber, 1872: 4 (nec Melichar, 1914)

[Melichar, 1914: 88; Muir, 1923: 226; 1930: 475; Metcalf, 1938: 381; 1954: 66; Servadei, 1967: 558; Fennah, 1982: 634; Asche and Wilson, 1989: 128].

Type genus. *Trypetimorpha* Costa, 1862.

Genera. *Trypetimorpha* Costa, 1862; *Ommatissus* Fieber, 1872 (see further for *Caffrommatissus*).

Distribution. Palaearctic, Oriental and Afrotropical regions, one species in Australia.

The group name was first proposed by Fieber (1872) but only formally erected later by Melichar (1914). In his catalogue, Metcalf (1954: 66) gave the authorship to Melichar. However, according to the International code of Zoological Nomenclature [Art. 11 f (iii)], the authorship has to be given to Fieber.

Diagnosis of Trypetimorphini follows Asche and Wilson (1989) except where we disagree with their remarks on the male genitalia (see Bourgoin and Huang, 1990) and with addition of those of female genitalia (Bourgoin and Huang, 1991).

Trypetimorpha Costa: 1862: 60

[Melichar, 1914: 198; Metcalf, 1954: 66; Ishihara, 1954: 18; Fennah, 1955: 125; 1982: 634; Chou *et al.*, 1985: 34; Asche and Wilson, 1989: 130].

Syn. *Trichoduchus* Bierman, 1910: 28 [Horváth, 1911: 338; Oshanin, 1912: 121; Asche and Wilson, 1989: 130].

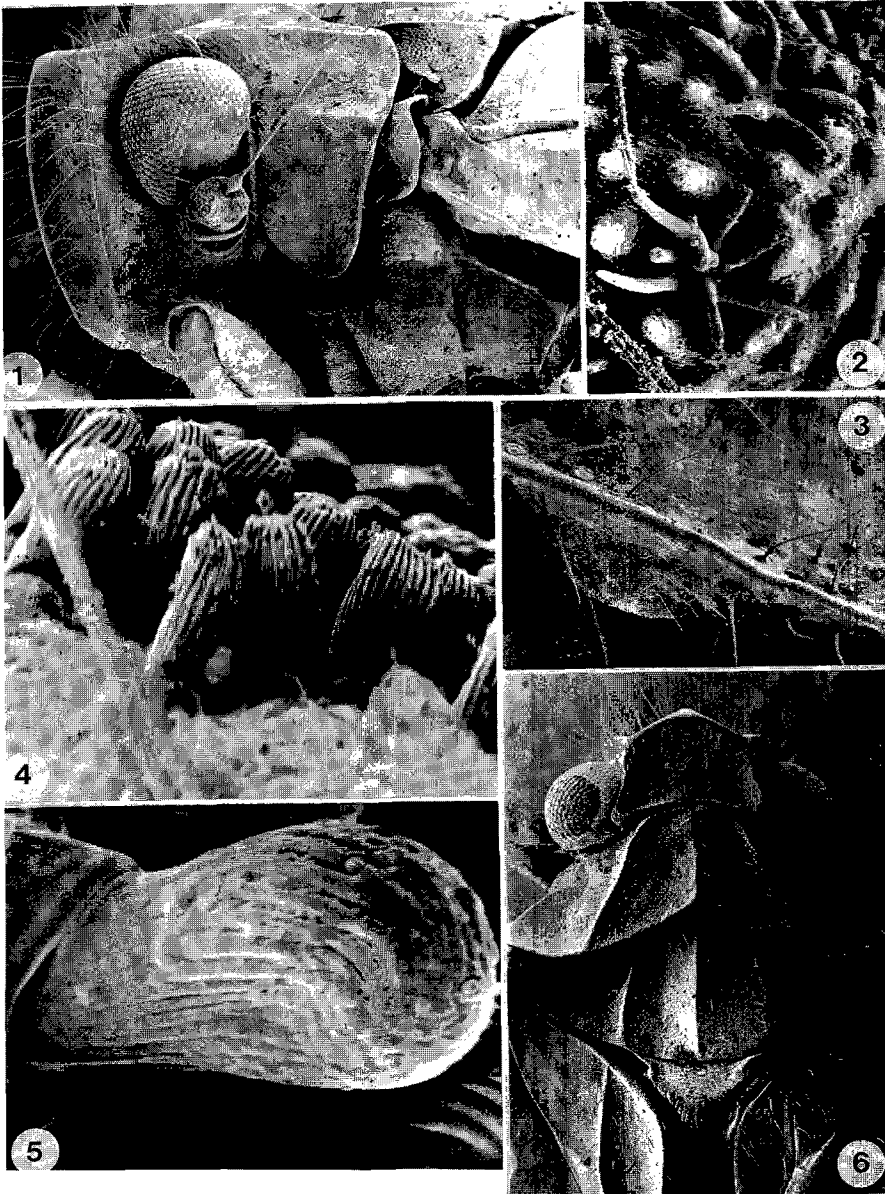
Type species. *T. fenestrata* Costa, 1862: 60, by subsequent designation by Oshanin, 1912: 121 (nec by original designation, Asche and Wilson, 1989: 130).

Distribution. Palaearctic, Oriental and Indo-Malaysian areas, one species in: East Africa, New Guinea and Australia.

Included species: *T. aschei*, sp. n.; *T. biermani* Dammerman; *T. canopus* Linnavuori; *T. fenestrata* Costa; *T. japonica* Ishihara; *T. occidentalis*, sp. n.; *T. sizhengi*, sp. n.; *T. wilsoni*, sp. n.

Small-sized troiduchids, length ranging from 3 to 6 mm. Tegmina coloration from pale brown to black; tegmina hyaline in macropterous forms. Several dark spots in head capsule and pronotum of taxonomic significance.

Vertex (Fig. 6) pentagonal, bounded by a ridged carina; anteriorly more or less convex-angled, posteriorly slightly concave, lateral parts strongly ridged. Median carina present, inconspicuous or missing. Frons visible dorsally on each side



FIGS 1–6. *Trypetimorpha japonica* Ishihara. (1) Head capsule and thorax, left lateral view ($\times 66$); (2) plate organs of pedicel ($\times 1115$); (3) Epipleuron ($\times 243$); (4, 5) new sensory and/or (?) glandular units on the ventral side of the second metatarsomer (4: $\times 2090$), (5: $\times 5570$), ventral view; (6) *Trypetimorpha biermani* (Dammerman): head capsule and thorax, dorsal view ($\times 49$).

of the vertex, laterally (Fig. 1) slightly curved; lateral carinae strongly marked. Clypeus darker than frons, anteclypal conical protrusion paler, pale yellow and membranous. Labium surpassing protrochanters, not or just reaching mesotrochanters, pointing ventrally; terminal segment broader than long, shorter than subapical segment. Lateral ocelli present, often with some anterior or posterior dark dots. Antennae with pedicel about 3 times as long as scape, produced anterodistally, with an anterior transverse brown streak; flagellum long, brown. Plate organ microdigitated (Fig. 2), absence of microstructures surrounding externally and internally the circular fold (Bourgoin and Deiss, in press). Several patches of dark spots on frons, vertex and gena.

Pronotum (Figs 1 and 6) pentacarinated, the more exterior carinae missing in their basal part. Anterior margin slightly convex, posterior one concave-angled. Lateral carina converging cephalad. Median carina reaching hind margin. Laterally, often two darker patches on each side of the latero-external carina. Mesonotum (Fig. 6) tricarinated, with a distinct transverse suture separating the mesoscutellum. Lateral parts of pterothorax with dark spots, folds yellowish.

In macropterous forms, tegmina hyaline, more or less deeply rounded at apical margin; epipleuron short (Fig. 3). Two main longitudinal cells, at least as long as half the tegmina length, formed by R and M and M and Cu; always longer than clavus; absence of subapical cells. Cross veins between Sc and R more or less obvious in the basal part. Cu and M basely indistinct or in a short common stem; anterior branch of MP generally forked in M1 and M2, posterior branch never forked; CuA2 always forked. Clavus length always shorter than half tegmina length. Two claval veins distinct, sometimes not meeting to form the fulgoridian-Y scheme. The strong intraspecific variation of venation prevents using it in taxonomic recognition.

In brachypterous forms, tegmina opaque, broader in their distal part, more or less truncated distally. Often pale spots in the two longitudinal cells. Subapical cells present. Generally cross veins more numerous than in the macropterous forms. Clavus length always shorter than half tegmina length. Only one claval vein distinct, rarely traces of the second vein (Figs 24 and 25).

Wings absent in brachypterous forms, hyaline and approximately half as short as the tegmina in macropterous forms.

Legs yellowish-white to pale brown with many scattered brownish dots, sometimes joined. Extremity of all spines and claws blackish. Metacoxal process depressed, triangular, yellowish-white. Post-tibia with 2 spines laterally, metatibio-tarsal formula: 7–8/7/2. Special and new sensory and/or (?) glandular units on the ventral side of the second metatarsomere (Figs 4 and 5).

Abdomen usually dark brown, intersegmental folds yellowish. Tergites separated into two hemitergites by a membranous fold. Two pairs of black-bright spots on posterior lateral parts of female abdominal segment VII, one laterodorsal pair on segment VIII.

Genitalia characters

Male genitalia (Figs 40–47). Two trapezoidal and symmetrical gonostyli. Exterodorsally armed with a hook like process between two dorsal projections. Aedeagus simple: a slightly curved sclerotized tube connected to an apical membranous endosoma; distal part of endosomal processes visible. Periandrium short with an asymmetrical left process. Tectiductus present, joining the connective to

the basal window. Anal tube more or less projected ventrally. A more complete description is given in Bourgoïn and Huang (1990).

Female genitalia (Figs 48–51). Dityrsian. Gonapophysis VIII of typical tropiduchid conformation, strongly sclerified with numerous dorsal and ventral irregular teeth, often in rows. Gonapophysis IX basely united, sclerified but poorly developed. Gonospiculum laterally tongue-shaped, free in the general cavity. Gonoplac membranous, devoid of teeth. Copulatory duct straight or curved, more or less sclerified at the base, opening directly into the bursa copulatrix. A more complete description is given in Bourgoïn and Huang (1991).

Key to species of *Trypetimorpha*

- 1 Vertex distinctly shorter or longer than wide. Male with lateral process of periandrium with two branches 2
 - Vertex almost as wide as long. Male with lateral process of periandrium unibranchied 3
- 2 Vertex shorter than wide—almost 1 : 2 (Figs 27, 28). In male: ventral stem of the lateral process of periandrium short, not reaching the middle of the aedeagus, dorsal stem distinctly passing beyond the ventral one (Fig. 13). In female: copulatory duct basal part straight (Fig. 21). Distribution: China, Vietnam *T. sizhengi*, sp. n.
 - Vertex longer than wide in front of eyes. In male: ventral stem of lateral process of the periandrium surpassing the middle of aedeagus, dorsal stem shorter than the ventral one (Fig. 11). In female: copulatory duct 'S'-shaped, of almost equal thickness on its whole length (Fig. 18). Distribution: China, Korea, Taiwan, Japan *T. japonica* Ishihara
- 3 Male with lateral process of the periandrium length more than three-quarters of aedeagus length, aedeagus straight, hook like processes of gonostyli thin. Female with copulatory duct straight 4
 - Male with lateral process of the periandrium length just surpassing half aedeagus length or shorter, aedeagus curved; hook-like processes of gonostyli thicker. Female with copulatory duct sinuous 5
- 4 Male with lateral process of the periandrium distally broader, more or less acute and sinuous dorsally (Fig. 14). Female with copulatory duct straight and thick (Fig. 22). Distribution: Australia *T. wilsoni*, sp. n.
 - Male with lateral process of the periandrium apically truncated, rounded, with two very little ventral teeth (Fig. 7). Female with copulatory duct gradually expanding to meet the bursa copulatrix (Fig. 15). Distribution: New Guinea *T. aschei*, sp. n.
- 5 Male with lateral process of the periandrium gradually narrowed and apically acute; aedeagus curved in a right angle in its middle part. Female with thick basal part of the copulatory duct shorter than wide 6
 - Male with lateral process of the periandrium apically truncated with a dorsal or ventral little projection; aedeagus weakly curved. Female with thick basal part of the copulatory duct longer than wide 7
- 6 Male with lateral process of the periandrium reaching half aedeagus length, regularly curved (Fig. 12); aedeagus thin: as wide as lateral process of the periandrium in its middle part (Fig. 12); gonostyli short, widely rounded apically (Fig. 45). Female with copulatory duct sinuous and thin (Fig. 20) *T. occidentalis*, sp. n.
 - Male with lateral process of the periandrium length less than half aedeagus length, strongly curved at its base (Fig. 9); aedeagus thicker: 1.5 times wider than lateral process of the periandrium in its middle part (Fig. 9); gonostyli acute-angled apically (Fig. 44). Female with copulatory duct weakly sinuous, strongly projecting beyond the posterior wall of the bursa copulatrix (Fig. 17). Distribution: Africa: Sudan *T. canopus* Linnavuori
- 7 Male with dorsal margin of lateral process of the periandrium smooth; apically: a little ventral projection (Fig. 8). Distribution: China, India, Philippines, Malaysia
T. biermani Dammerman

- Male with dorsal margin of lateral process of the periandrium wavy or irregular, apically truncated with a little dorsal projection (Fig. 10). Distribution: Hungary, Israel, Italy *T. fenestrata* Costa

Species descriptions

Trypetimorpha aschei, sp. n.

(Figs 7, 15, 23, 24, 43, 48)

Habitus (Figs 23, 24). Head and thorax yellowish-brown. Vertex almost as wide as long, median carina weakly marked or not. Two obscure transverse frontal spots in some macropterous forms. Clypeus generally darker than frons. Pronotum with three pairs of brown spots: one on the disk and on each side of the lateral carina. Mesonotum darker than pronotum. Tegmina in brachypterous females almost twice as long as wide, brown with paler veins. One hyaline rounded spot in the R-M cell and two in the M-Cu cell; hyaline in macropterous, brownish at their base and clavus.

Male genitalia (Figs 7, 43). Gonostyli trapezoidal, the anterior protrusion acute, the hook-like process turning ventrad. Aedeagus straight, lateral process of the periandrium longer than three-quarters of aedeagus length, apically truncated, rounded; subapically two very little but distinct teeth on the ventral margin. Laterally, urite × dorsal margin almost as long as ventral one.

Female genitalia (Figs 15, 48). Copulatory duct straight, gradually expanding to join the bursa copulatrix base, opening widely in it.

Measurements. (b = brachypterous form; M = macropterous form). Tegmen length: ♀ b: 2.8 mm, ♀ M: 3.3–3.4 mm, ♂ M: 3.7 mm.

Host plant. Unknown.

Distribution. **New Guinea**.

Material examined. † Seven specimens (1 holotype, 6 paratypes).

HOLOTYPE, ♂: **New Guinea**: Papua, W. District, Oriomo Govt. Sta., 26–28.X.1960/J. L. Gressit collector (BPBM).

PARATYPES: 2 ♀: same data as holotype (BPBM). 1 ♂: **New Guinea**: Papua, W. District, Oriomo Govt. Sta., 26–28.X.1960/J. L. Gressit collector/MNHN-HF-90-254 [abdomen dissected] (MNHN); 1 ♀: Papua, Bisianumu Sta., 40 km NNW Port Moresby, 28.IV.'60/C. W. O'Brien collector [abdomen dissected] (MNHN). 1 ♀: same data as holotype (BMNH). 1 ♂: same data as holotype, [abdomen dissected] (PISC).

Remarks. Similar in external appearance to *T. biermani* but male and female genitalia give obvious specific indications to separate the two species: length of the lateral process of the male periandrium and form of the female copulatory duct.

Trypetimorpha biermani (Dammerman in Bierman, 1910)

(Figs 6, 8, 16, 30–39, 41, 51)

[Melichar, 1914: 200; Metcalf, 1954: 70; Fennah, 1955: 125; 1982: 634.]

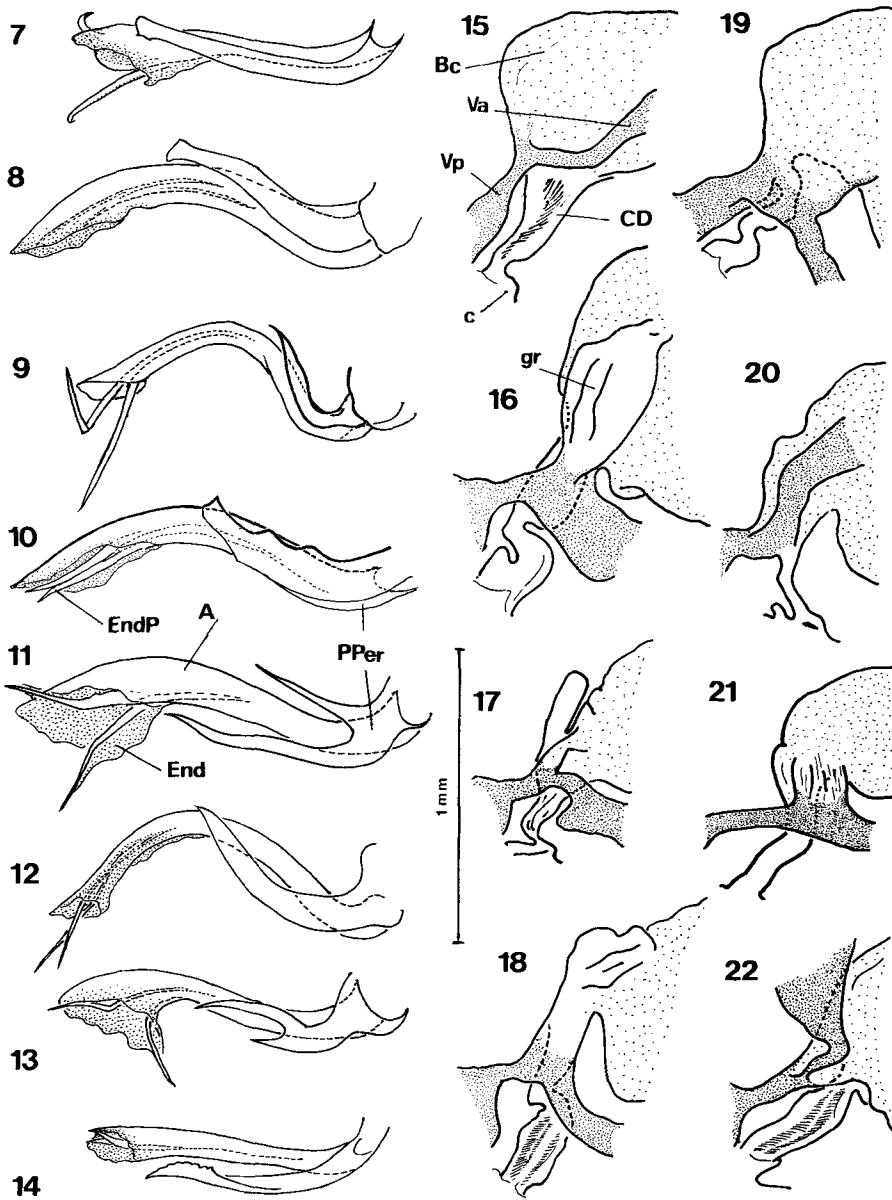
Trichoduchus biermani Muir, 1913: 255, syn. n.

Trichoduchus china Wu, 1935: 105, syn. n.

Trypetimorpha china (Wu, 1935), in Asche and Wilson, 1989: 130, syn. n.

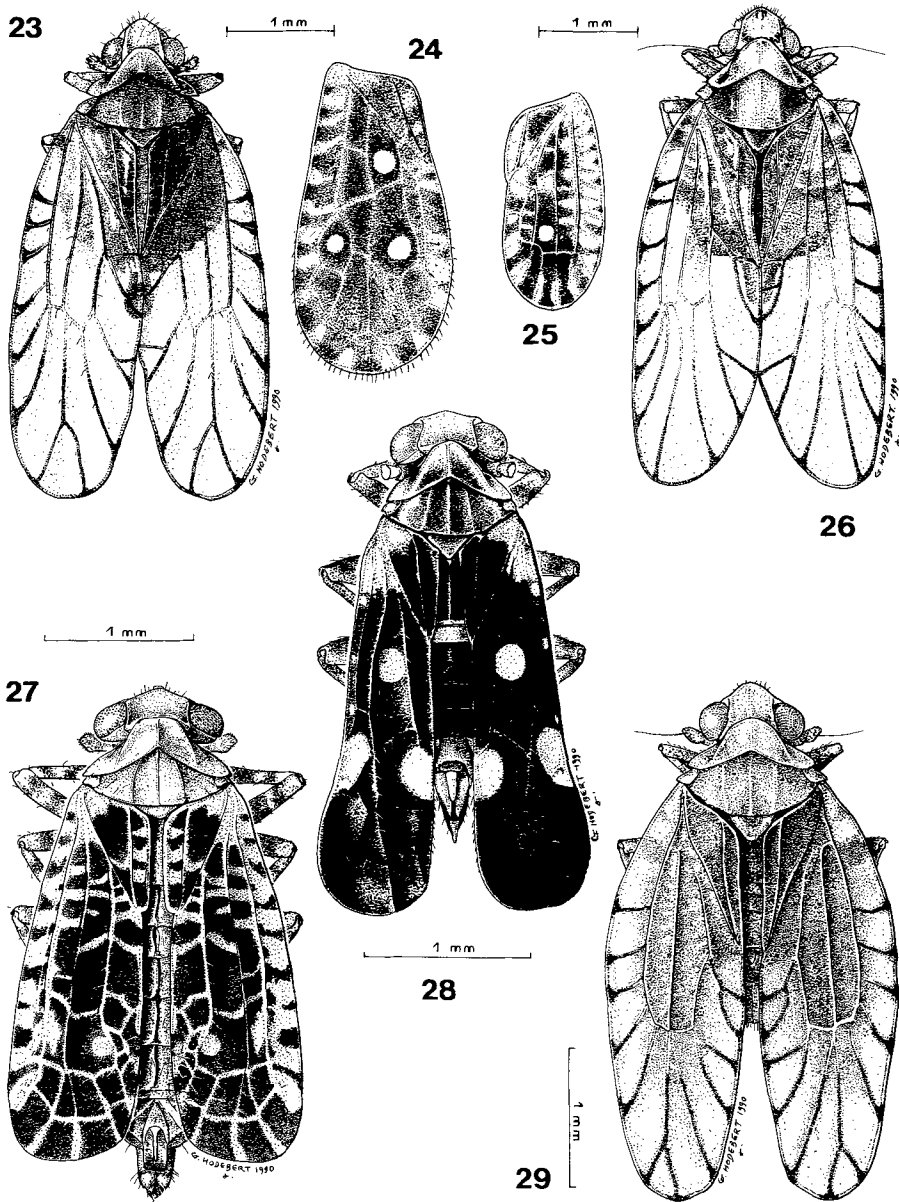
Trypetimorpha formosana Ishihara, 1954: 19, syn. n.

† (Data are recorded in their original form (abbreviations, capital or small letters, ...); each label under specimens are separated by /; special information is in brackets [...]).



FIGS 7-14. Apical parts of male genitalia, left side. (7) *Trypetimorpha aschei*, sp. n.; (8) *Trypetimorpha birmani* (Dammerman); (9) *Trypetimorpha canopus* Linnavuori; (10) *Trypetimorpha fenestrata* Costa; (11) *Trypetimorpha japonica* Ishihara; (12) *Trypetimorpha occidentalis*, sp. n.; (13) *Trypetimorpha sizhengi*, sp. n.; (14) *Trypetimorpha wilsoni*, sp. n. A, sclerotized tube of aedeagus; End, apical membranous endosoma; EndP, distal part of endosomal processes; PPer, asymmetrical left process of the perianthrium.

FIGS 15-22. Basal parts of female genitalia, right side. (15) *Trypetimorpha aschei*, sp. n.; (16) *Trypetimorpha birmani* (Dammerman); (17) *Trypetimorpha canopus* Linnavuori; (18) *Trypetimorpha fenestrata* Costa; (19) *Trypetimorpha japonica* Ishihara; (20) *Trypetimorpha occidentalis*, sp. n.; (21) *Trypetimorpha sizhengi*, sp. n.; (22) *Trypetimorpha wilsoni*, sp. n. Bc, bursa copulatrix; c, copulaporus; CD, copulatory duct; gr, strengthened groove of bursa copulatrix; Va, Vp, anterior, posterior part of the vagina.



FIGS 23–29. Habitus. (23) *Trypetimorpha aschei*, sp. n., macropterous form; (24) *Trypetimorpha aschei*, sp. n., left tegmen, brachypterous form; (25) *Trypetimorpha occidentalis*, sp. n., right tegmen, brachypterous form; (26) *Trypetimorpha occidentalis*, sp. n., macropterous form; (27) *Trypetimorpha sishengi*, sp. n., ♀, brachypterous form; (28) *Trypetimorpha sishengi*, sp. n., ♂, brachypterous form; (29) *Trypetimorpha wilsoni*, sp. n.

Head (Fig. 6) and thorax yellowish brown. Vertex almost as long as wide (1 : 0.85); median carina absent, sometimes slightly marked on its basal half; disk yellowish, with pale brown spots close to lateral ridged margins. One or two pairs of pale brown spots on the frons, the basal one sometimes confluent. Clypeus yellowish to brown. Laterally a large pale brown spot on the gena and another one more or less surrounding the ocella; genomaxillary sulcus dark brown. Tegmina hyaline in macropterous forms, most veins dark brown; darker in brachypterous with three hyaline spots and whitish veins. Wings whitish, basal part pale brown.

Male genitalia (Figs 8, 41). Gonostyli triangular. Aedeagus slightly curved. Lateral process of the periandrium unbranched, surpassing the middle length of the aedeagus; apically wider with a ventral apical projection. Laterally, urite \times dorsal margin longer than the ventral one. A weak intraspecific variation occurs within the species in the form of gonostyli, and in the apical part of the asymmetrical process of the periandrium (Figs 30–39).

Female genitalia (Figs 16, 51). Thick basal part of the copulatory duct straight; dorsal part thinner and sinuous; strengthened groove (Fig. 16, gr) of bursa copulatrix (Bourgoïn and Huang, 1991) well marked.

Measurements. Tegmen length: δ b: 2.3–2.8 mm, δ M: 3.1–3.2 mm, δ b: 2.4–3 mm, δ M: 3.1–3.4 mm.

Host plant. Mango, Fennah (1982: 634) (likely to be a casual record).

Distribution. **India** (Bihar), **China** (Shandon, Anhui), **Taiwan**, **Macao**, **Malaysia**, **Philippines** (Palawan, Mindanao, Luzon, Culion).

Material examined. 115 specimens, including 5 syntypes of Dammerman and 3 syntypes of Muir.

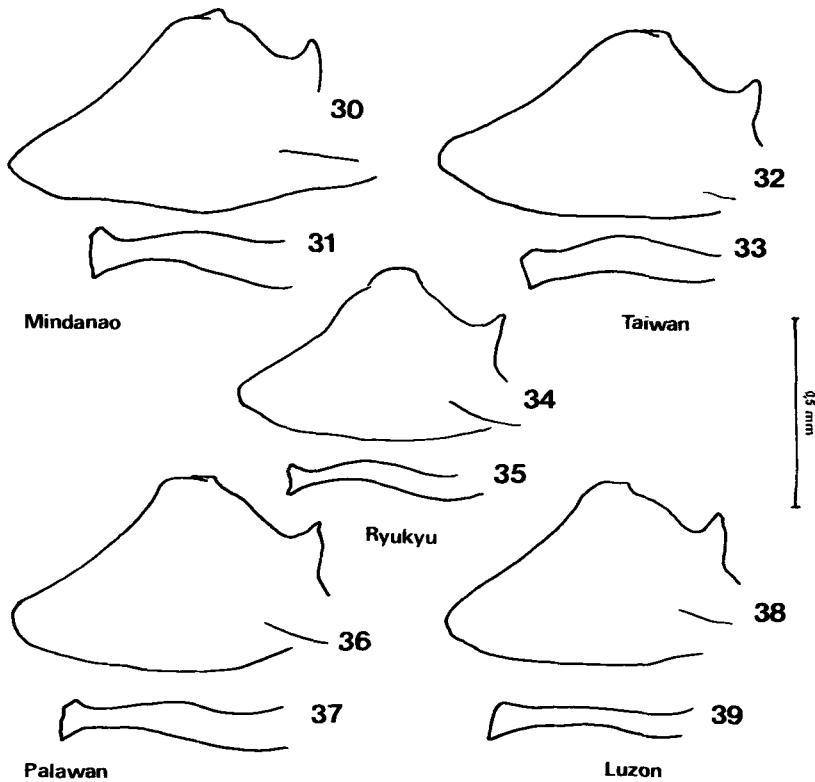
Dammerman's specimens: 3 syntypes (2 δ , 1 δ) of *T. biermani* and 2 [*sic*] syntypes of *T. biermani* var. *media* [from Semarang, Java, Indonesia (RMNH)]. In fact only one specimen was selected by Dammerman for this variety. The second specimen, var. *hyalina*, was said to be lost. Probably one of the two specimens we have seen as syntypes of *media* correspond to the 'lost' variety.

Muir's specimens: 3 δ : *Trichoduchus biermani* Muir 1913: Macao, F. Muir/*Trichoduchus biermani* Muir 1913 = *Trypetimorpha biermani* (Dammerman), [one female with abdomen dissected] (BMNH).

In BMNH: 17 specimens from **Philippines** [all males with abdomen dissected] from different islands: Palawan, Mindanao, Luzon, Culion. Six specimens from south of **China** (province of Fou Kien: Chungan). One specimen from **Hong Kong**, **Taiwan** and **Ryukyu** Islands (Miyako). Two specimens from **Malaysia** (Kuala Lumpur). One specimen from **India**: 224, Pusa Coll./848, on grass, Pusa, Bengal, 1.XII.1904, P.U.N./from Ind. Mus., Distant Coll., B.M. 1911–383/ δ [abdomen dissected]. Fennah (1982) mentioned another female (var. *hyalinus*) from **India** (Pusa) on Mango.

Five δ from **Philippines**: Davao, Mindanao, Luzon (USNM). 11 δ , 4 δ from **China**: Fei hien, 19.VI.36/Museum Paris, Coll. Licent; and 1 δ , 1 δ from China: Cheu Tao, 26.VIII.36/Museum Paris, Coll. Licent (MNH). Sixty-four specimens from China (provinces of Shanxi, Shandon: Taishan) (PISC). Three specimens from China (province of Anhui: Xuanchen) (IZAC).

Remarks. This species is difficult to separate from *T. fenestrata* by external characters but the lateral process of the periandrium gives the best character to separate the species. We were unable to find any specific characters to separate the females in these two species but the distributions are distinct. Although we did not see the type



FIGS 30–39. Intraspecific variation of the lateral process of periandrium and gonostyli form in *Trypetimorpha biermani* (Dammerman).

of *T. formosana* (a female) the primary description and drawings do not give any difference from *T. biermani*. The 3 syntypes of Muir of *T. biermani* Muir (= *T. china* Wu) are clearly conspecific with *T. biermani* Dammerman.

***Trypetimorpha canopus* Linnavuori, 1973: 119**

(Figs 9, 17, 44)

Head and thorax yellowish brown. Vertex almost as long as wide (1 : 0.9); median carina marked on its basal half in two specimens, missing in the third one; disk yellowish, with two pale brown spots close to lateral ridged margins. Two pairs of brown spots on the frons, the basal ones blackish, extended, and sometimes confluent. Clypeus yellowish to brown. Laterally a dark brown band on the gena joining posterodorsally the base of the compound eye; another one more or less surrounding the ocella. Tegmin in macropterous forms hyaline at base, with pale to dark brown areas in the longitudinal cells; veins dark apically.

Male genitalia (Fig. 9). Gonostyli triangular and short (Fig. 44). Aedeagus curved in a right angle in its middle part. Lateral process of the periandrium unbranched, thinner than aedeagus, not reaching the middle length of the aedeagus; apically acute. Laterally, urite × dorsal margin little longer than the ventral one.

Female genitalia (Fig. 17). Basal part slightly sinuous, strongly projecting beyond the posterior wall of the bursa copulatrix.

Measurements. Tegmen length: ? (all tegmina broken).

Host plant. Unknown.

Distribution. East Africa: **Sudan**.

Material examined. Three specimens, the type (♀) and two paratypes (1♂, 1♀): **Sudan**: Blue Nile, Ingessena Mts, 18–22.XI.62, Linnavuori (AMNH).

Trypetimorpha fenestrata Costa, 1862: 60

(Figs 10, 18, 40, 50)

[Horváth, 1897: 96; Melichar, 1914: 199; Metcalf, 1954: 67; Servadei, 1967: 558; Nast, 1972: 100.]

Trypetimorpha psyllipennis Costa, 1862: 64, synonymized by Horváth, 1897: 96.

Trypetimorpha pilosa Horváth, 1907: 323, syn. n.

Trichoduchus pilosus (Horváth, 1907) syn. n. (Melichar, 1914: 202; Metcalf, 1954: 71; Servadei, 1967: 558; Nast, 1972: 100).

Vertex almost as long as wide (0.8 : 1); median carina absent sometimes slightly marked on its basal half; disk yellowish, without dark brown spot, sometimes a pair of little darker pale brown dots close to lateral ridged margins. Two pairs of darker pale brown spots on the frons: the basal one sometimes confluent. Clypeus pale yellow to brown. Laterally a large darker brown spot on the gena and another one more or less surrounding the ocella; genomaxillary sulcus always dark brown. Disk of pronotum and mesonotum between the lateral carinae yellowish-brown; sometimes a pair of darker spots. Tegmina hyaline in macropterous forms, much darker in brachypterous with three hyaline spots and whitish veins. Wings white, basal part obscured.

Male genitalia (Figs 10, 40). Gonostyli triangular, elongated. Aedeagus curved. Lateral process of the periandrium unbranched, wavy or irregular, just reaching the middle length of the aedeagus; generally two little rounded dorsal projections on its dorsal margin; an acuted dorsal apical one. Specimens from Israel (AMNH's collections) have the apical part of the lateral process of the periandrium much rounded, irregular, the dorsal tooth less distinctive. Laterally, urite × dorsal margin as long as the ventral one.

Female genitalia (Figs 18, 50). Thick basal part of the copulatory duct straight; dorsal part thinner and sinuous.

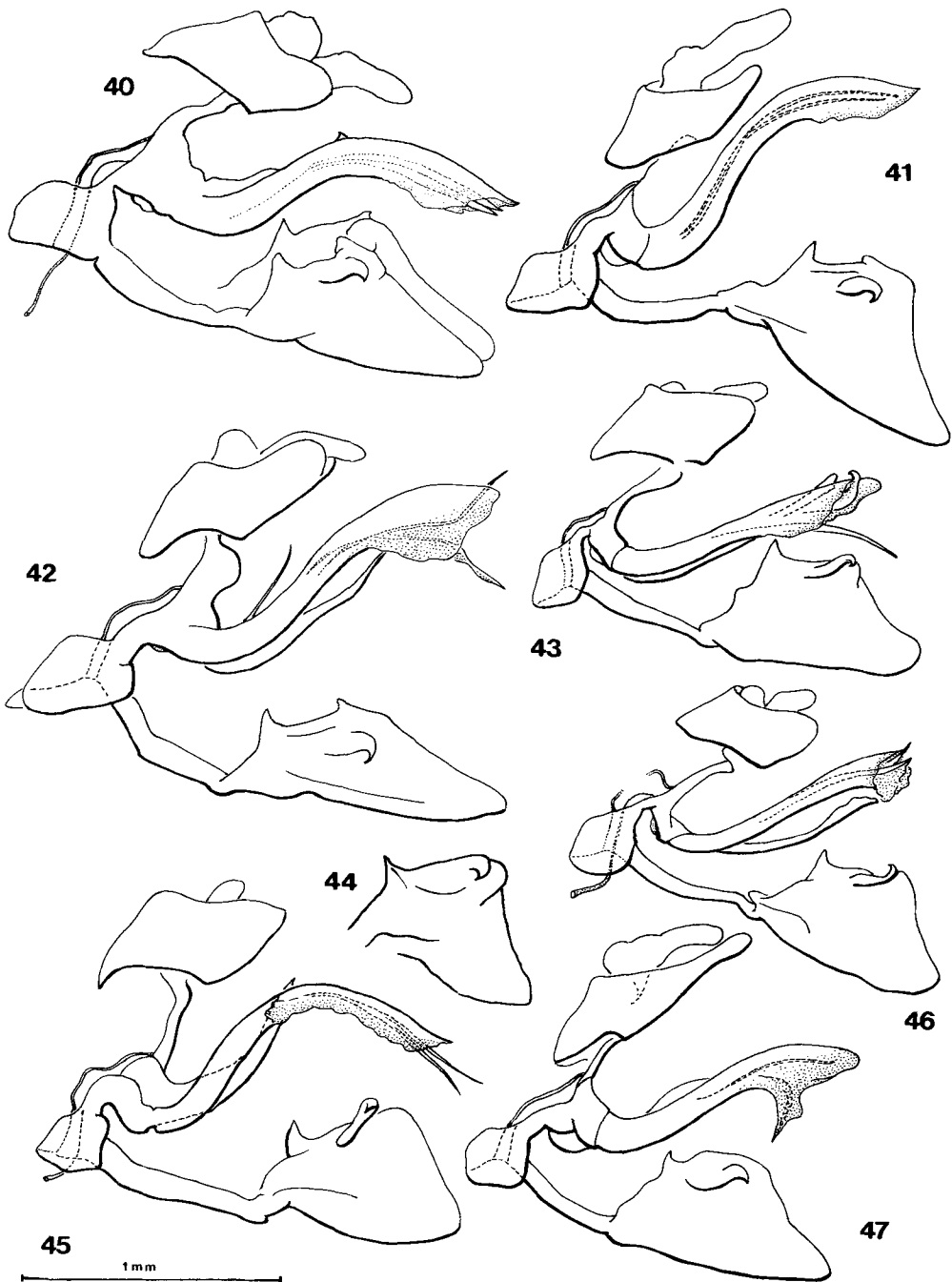
Measurements. Tegmina length: ♂b: 2.7–2.9 mm, ♂M: 3.3–3.7 mm, ♀b: 2.3–2.7 mm, ♀M: 3.7–3.9 mm.

Host plant. Unknown.

Distribution. **Cyprus**, **Yugoslavia** (Dalmatia), **Algeria** (Lamartine), **Israel**, southeast of **Italy** and **Greece** (R. Remane, personal communications).

Material examined. Thirty specimens, including the 2 syntypes of *T. fenestrata* [from Solfatara, Italy (UNPI)] and the 12 syntypes of *T. pilosa* Horváth, 1907 [from Zupa, Teodo, Dalmatia, **Yugoslavia** (HNHM)].

1♂ and 1♀ from de Bergevin's collection: Lamartine/Collection de Bergevin/Museum Paris (MNHN). 1♀: Cypr. Famagusta, 9–12.VII.39, Hakan Lindb./Brit. Mus. 1948–6/*Trypetimorpha pilosa* Horv. Hak. Lindb. det. (BMNH); 1♂, 2♀: Dalmatia, Horváth/Teodo 906 (Zupa)/*Trypetimorpha pilosa* Horv., det. Horváth/Brit. Mus. 1956–126 (those specimens belong to the same series of the syntypes of *T. pilosa*) (BMNH); 1♀: Cyprus: Akrotiri Bay marshes, 24.X.1956,



FIGS 40–47. Male genitalia, right side. (40) *Trypetimorpha fenestrata* Costa; (41) *Trypetimorpha birmani* (Dammerman); (42) *Trypetimorpha japonica* Ishihara; (43) *Trypetimorpha aschei*, sp. n.; (44) *Trypetimorpha canopus* Linnavuori right gonostylus; (45) *Trypetimorpha occidentalis*, sp. n.; (46) *Trypetimorpha wilsoni*, sp. n.; (47) *Trypetimorpha sizophengi*, sp. n.

G. Mavromoustakis, B.M. 1957–395 (BMNH). Nine specimens from **Israel**: Hula, Bat Yam (ex. Linnavuori coll., 1958) (AMNH).

Remarks. Costa (1862) described two species: *T. fenestrata* and *T. psyllipennis*. The two species were synonymized by Horváth (1897) specifying that the second one was the macropterous form of the first. In 1907 the same author described *T. pilosa* and he compared it with *T. fenestratae* [sic] specifying, among other characters, the absence of the vertex's dark spots in *T. pilosa* in opposition to *T. fenestrata* (1907: 323). Indeed this character is clearly specific, but it is lacking in all Costa's syntypes of *T. fenestrata* (which unfortunately are females). Moreover, syntypes of *T. pilosa* only differ from the syntypes of *T. fenestrata* by the longer hairs, a character of non-specific value. Thus the two series of syntypes are considered as conspecific and priority is given to *T. fenestrata*.

However, when Horváth described *T. pilosa* he clearly indicated that he was comparing it to another species with a dark spotted vertex which he thought to be the Costa's species: '*T. fenestrata sensu* Horváth'. This species has never been described but, since, all authors followed Horváth's interpretation. This species is here described as *T. occidentalis* (see below).

Trypetimorpha japonica Ishihara, 1954: 18

(Figs 1–5, 11, 19, 42)

[Chou *et al.*, 1985: 35.]

Tripetimorpha [sic] *yanonis* Matsumura, nom. nud., in Ishihara, 1954: 18.

Trichoduchus japonicus Fennah, 1955: 125, synonymized by Asche and Wilson, 1989: 130.

Trypetimorpha koreana Kwon and Lee, 1979: 63, syn. n.

Vertex distinctly longer than wide; median carina well marked at least on its basal half; disk strongly produced anteriorly, in some specimens with a pair of brown parasagittal spots near the anterior margin and another one on the lateral ridged margins. Frons with two transverse dark brown bands; median carina very strongly produced. Clypeus dark brown with pale dots. Laterally, in prolongation of the basal brown band of the frons, a brown one on the gena extending to the ventral margin of the compound eye often with a little brown spot above them; ocelli more or less surrounded with brown. Tegmina hyaline in macropterous forms, obscured in the two longitudinal cells and in the clavus, with dark brown radial veinlets; in brachypterous specimens all the radial cells possess a wide dark brown band. Wings whitish, basal part obscured.

Male genitalia (Figs 11, 42). Gonostyli triangular, elongated. Aedeagus slightly curved. Lateral process of the periandrium two-branched, ventral stem surpassing the middle length of the aedeagus, longer than the dorsal one. Laterally, urite \times dorsal margin shorter than the ventral one.

Female genitalia (Fig. 19). Thick basal part of the copulatory duct sinuous, of almost equal thickness on its whole length.

Measurements. Tegmina length: ♂b: 1.9–2.7 mm, ♂M: 3.3–3.4 mm, ♀b: 2–2.5 mm, ♀M: 3.3–3.5 mm.

Host plant. Unknown.

Distribution. **China** (Provinces of Beijing, Shandong, Shanxi, Anhui), **Taiwan**, **Japan**, **Korea**.

Material examined. Fifty-six specimens.

Twenty-four specimens from **China**: 1 ♂: Chine, province of Anhui, Xuanchen-4.X.1986, Wang Fanxiao coll. (J. Huang Leg. IX.1990) (MNHN); 1 ♂: Chine, Bejin, Sanbao, 19.VIII.1964, Liao Subai coll. (J. Huang Leg. IX.1990) (MNHN); 1 ♂: Chine, province of Shanton, Taishan-21.IV.1974, Yang Jikun coll. (J. Huang Leg. IX. 1990) (MNHN). From the Licent's collection: 1 ♀: Weitzeping, 15.VIII.16/Chensicent, Licent (MNHN); 1 ♂, 1 ♀: Tch'a p'en t'an/28.VIII.34 (MNHN). 4 ♂, 4 ♀: province of Anhui, Xuanchen; 3 ♂, 1 ♀: province of Shandon, Taishan; 4 ♂, 2 ♀: Beijing (PISC). 26 Specimens from **China**: 11 ♂, 15 ♀: Beijing (IZAC).

Five specimens from **Korea**: 3 ♀: Dansan Myeon, Gyeongbug Pr, Korea, 13.VIII.1983, Y. J. Kwon leg. (BMNH); 1 ♂: Mt. Geumosan, Gyeongbug Pr, Korea, 2.IX.1979, Y. J. Kwon leg. (BMNH); 1 ♀: Gamcheon Myeon, Yecheon Gun, G.B.-Pr., Korea, 7.IX.1980, Y. J. Kwon leg. (BMNH).

One specimen from **Taiwan**: 1 ♀: Formosa, Matsumura/*Trichoduchus formosanus* Mats [specimen with abdomen dissected] (BPBM).

Remarks. Although it was not possible to see Ishihara's type, it is highly probable that *T. japonica* Fennah (1955) and *T. koreana* Kwon and Lee (1979) are synonyms of Ishihara's species. The shape of the vertex, of the frons and of the ventral stem of the lateral process of the periandrium, the presence of the two frontal transverse dark brown bands, are specific characters present in the three descriptions. The absence of the second dorsal stem in the illustrations of Ishihara (1954) and Fennah (1955) is easily explained by its very thin dimensions and uncoloured tegument.

Trypetimorpha occidentalis, sp. n.

(Figs 12, 20, 25, 26, 45, 51)

Trypetimorpha fenestratae [sic] Costa, *sensu* Horváth, 1907: 323.
[Servadei, 1967: 558; Nast, 1972: 100; Logvinenko, 1975: 201.]

Habitus (Figs 15, 26). Vertex slightly longer than wide but not distinctly; median carina well marked at least on its basal half, but some specimens without; disk with a pair of dark brown parasagittal spots near of the anterior margin and two other pairs, sometimes confluent, on the lateral ridged margins. Three pairs of black spots on the frons: basal, median and in the upper lateral part. Clypeus brown. Laterally four pairs of black spots: dorsal and posteroventrally to compound eyes, dorsal to ocelli and a large one on the gena. Disks of pronotum and mesonotum between the lateral carinae with a pair of black spots. Tegmina hyaline in macropterous forms: in brachypterous, posteriorly rounded, only one claval vein; one or two hyaline spots in the distal part of M-Cu longitudinal cell. Wings whitish, basal part obscured.

Male genitalia (Figs 12, 45). Gonostyli triangular, short, apically rounded. Aedeagus strongly curved in a right angle. Lateral process of the periandrium unbranched surpassing the middle length of the aedeagus, regularly narrowed and apically acute. Laterally, urite × dorsal margin as long as ventral one.

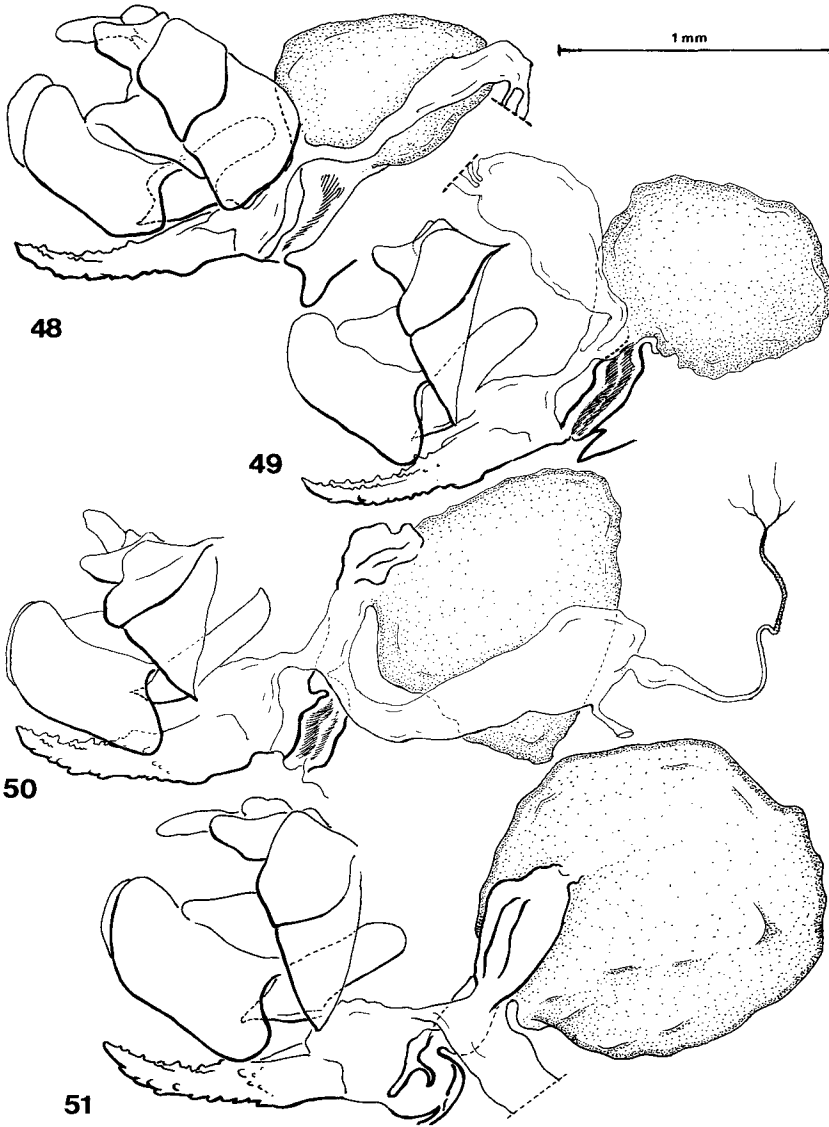
Female genitalia (Fig. 20). Thick basal part of the copulatory duct shorter than wide, then thin and sinuous.

Measurements. Tegmina length: ♂b: 2.1–2.9 mm, ♂M: 3.6–4 mm, ♀b: 2.6–2.9 mm, ♀M: 3.7–4.2 mm.

Host plant. Unknown.

Distribution. Western Europe from CIS to Italy, south of France and Spain (R. Remane, personal communication).

Material examined. Seventy-eight specimens including 55 paratypes and 1 holotype.



FIGS 48–51. Female genitalia, right side. (48) *Trypetimorpha aschei*, sp. n.; (49) *Trypetimorpha wilsoni*, sp. n.; (50) *Trypetimorpha fenestrata* Costa, type of Costa; (51) *Trypetimorpha biermani* (Dammerman).

HOLOTYPE ♂: Agropyre, Palette/Aix, 16.8.42/*Trypetimorpha fenestrata* [hand written by Ribaut]/MNHN-HF-90-269 [specimen with abdomen dissected] (MNHN).

PARATYPES. Forty-nine specimens: 28 ♂, 20 ♀, 1 N.

Three specimens from Ribaut's collection (MNHN): 2 ♂ on the same label: Callian, Var. L. Berland 1926/septembre/MNHN-HF-90-269 [one specimen with abdomen dissected]; 1 ♀: Lancate (Aude), 15.VII.34, coll. Ribaut/MNHN-HF-90-269. Height specimens from Puton's collection (MNHN): 1 ♂, 1 ♀: Pesrét/MNHN-HF-90-269; 2 ♀: Avignon/MNHN-HF-90-269; 3 ♂, 1 ♀: [one male with abdomen dissected]: Serbia, Sv. Petka, Horváth, sept. 1902/Museum

Paris, in coll. Puton/MNHN-HF-90-269. Three specimens from de Bergevin's collection: 1♂: Aix, 16.7.42/*Trypetimorpha fenestrata* Costa, B. du Rhône, Macroptère [hand written by de Bergevin]/MNHN-HF-90-269 [specimen with abdomen dissected]; 1♀: same data but 'Brachyptère' [specimen with abdomen dissected]; 1♀: Valbonne, Alpes mar./Paratype/MNHN-HF-90-269. Ten specimens from the MNHN general collection: 4♂, 5♀, 1N: **France**: Vaucluse, St Pierre de Vassol, grasses, 29.VII.79, M. R. Wilson/Museum Paris, Leg. M. Wilson, IX.90/MNHN-HF-90-269 [one male specimen with abdomen dissected].

Twenty-five specimens from **France**: 17♂, 8♀: France: Vaucluse, St Pierre de Vassol, grasses, 29.VII.79, M. R. Wilson (BMNH). Six specimens from **France**: 1♂, 2♀: France, ex coll. Puton, Leg. Th. Bourgoïn, IX.90/(PISC); 1♀: France, ex coll. de Bergevin, Leg. Th. Bourgoïn, IX.90 (PISC). 1♂: Agropyre, Palette/Aix, 17.8.42/ex coll. Ribaut/Leg. Th. Bourgoïn, IX.90 (PISC); 1♀: France: Vaucluse, St Pierre de Vassol, grasses, 29.VII.79, M. R. Wilson/Leg. M. Wilson, IX.90 (PISC).

Other specimens examined. Cypr. Athalassa, 24.VI.39, Hakan lindb./Brit. Mus., 1948-6/*Trypetimorpha fenestrata*, Hak. Lindb. det. (BMNH); 1♂: Gödöllő, Ujhelyi/1931.VIII.25/*Trypetimorpha fenestrata* Costa, det. Soos/Brit. Mus., 1956-126 (BMNH); 1♂: N.E. Serbia, Deliblato Sanos, DK. 28.VII.54/Brit. Mus. 1957-353/*Trypetimorpha fenestrata* Costa, det. R. J. Izzard. 1987 (BMNH); 5♂ and 7♀: France: Vaucluse, St Pierre de Vassol, grasses, 29.VII.79, M. R. Wilson (BMNH).

Remarks. This species correspond to the description of *T. fenestratae* [sic] in Horváth, 1907: 323 (see remarks for *T. fenestrata* Costa).

Trypetimorpha sizhengi, sp. n.

(Figs 13, 21, 27, 28, 47)

Habitus (Figs 27, 28). Vertex transverse, distinctly shorter than wide, almost rectangular (0.6:1); anterior margin weakly convex, median carina unmarked; disk with a large dark brown spot. Dorsal part of frons and above the antenna yellowish-pale, ventral part of frons, the gena below the antenna and the clypeus black-brown, except the yellowish-white conical protrusion. Pronotum yellowish-white with some indistinct brown patches on each side of the lateral carina. Mesonotum and scutellum darker than pronotum. Only brachypterous forms known: tegminae narrow, posteriorly more or less truncated, only one claval vein; in male bright black-brown except in three irregular spots and near the tegula pale yellow; in female tegminae paler yellowish-brown, veins pale yellow; one hyaline spot in the distal part of M-Cu longitudinal cell. Wings whitish, basal part obscured.

Male genitalia (Figs 13, 47). Gonostyli trapezoidal, posteriorly acute. Aedeagus slightly curved. Lateral process of the perianthium bifurcated, dorsal process just surpassing the middle length of the aedeagus, ventral process short. Laterally, urite × dorsal margin distinctly shorter than ventral one.

Female genitalia (Fig. 21). Copulatory duct straight and thick.

Measurements. Tegmina length: ♂b: 2.2-2.5 mm, ♀b: 2.1-2.5 mm. Macropterous form unknown.

Host plant. Unknown.

Distribution. **China, Vietnam.**

Material examined. Eighteen specimens (1 holotype + 17 paratypes).

HOLOTYPE ♂: **China**: Prov. Anhui, Xuanchen, 4.X.1986, Wang Fanxiao, in PISC.

PARATYPES: 1♂, 10: same indications as holotype (PISC); 1♀: **China**, Prov. Anhui, Xuanchen, 18.VII.1979, Huang Ju (PISC). 1♂, 3♀: **China**, Prov. Anhui, Xuanchen, 4.X.1986, Wang Franxiao coll. (J. Huang Leg. IX.90)/MNHN-HF-90-268 [1 with abdomen dissected] (MNHN). 1♂: **Vietnam**, 18 km N.W. of Dalat, 1300 m, 4–5.V.1960/S. Quate and L. Quate collectors (BPBM).

Remarks. This species is easily separable from all others by the form of the vertex and tegmina, the male and the female genital characters.

Trypetimorpha wilsoni, sp. n.

(Figs 14, 22, 29, 46, 49)

Habitus (Fig. 29). Vertex almost as wide as long, median carina weakly marked or not. Frons and gena yellowish-pale brown. In most specimens a transverse darker band on the gena below the antenna and a black spot on or behind the ocella. Clypeus darker with 3 brown longitudinal bands sometimes confluent. Pronotum and mesonotum yellowish-white in brachypterous, mesonotum and scutellum brown in macropterous. Pronotum with two pairs of brown spots on each side of the lateral carina. Tegmina hyaline in macropters, pale-brown in the two longitudinal cells, veins brown; in brachypters, dark brown to black with pale veins.

Male genitalia (Figs 14, 46). Gonostyli trapezoidal. Aedeagus straight. Lateral process of the periandrium longer than three-quarters of aedeagus length, apically broader, more or less acuted and sinuous dorsally; apically a tendency to envelope ventrally the aedeagus. Laterally, urite × dorsal margin almost as long as ventral one.

Female genitalia (Figs 22, 49). Copulatory duct straight and thick.

Measurements. Tegmina length: ♂ b: 2.3–3.1 mm, ♂ M: 3 mm, ♀ b: 2.6–2.9 mm, female macropterous form unknown.

Host plant. Unknown.

Distribution. **Australia.**

Material examined. Eighteen specimens including 13 paratypes and 1 holotype.

HOLOTYPE ♂: **Australia**: SE Qld., Mt. Glorious, Rain forest, 13.II.1961/L. and M. Gressitt collectors, Bishop Mus. (BPBM).

PARATYPES, all from **Australia**: 1♂: same labels as holotype [abdomen dissected] (BPBM). 1♂: **Australia**: Ashfou Pic., 21.II.1960; M. I. Nikitin., B.M. 1960–370 (BMNH); 1♀: same data [abdomen dissected]; 1♂: Northmead, NSW, 26.I.1963, D. K. McAlpine. Six specimens: 3♂, 1♀: Timor Rock, Warrumbungle Range, NSW, 27.III.1971, D. K. McAlpine (AMS); 2♂: Northmead, NSW, 26.I.1963, D. K. McAlpine (AMS); 1♂, 1♀: same data (PISC) and 1♂, 1♀: same data, MNHN-HF-90-270 (MNHN); 1: Timor Rock, Warrumbungle Range, NSW, 27.III.1971, D. K. McAlpine, MNHN-HF-90-270 (MNHN); 1♂: same data (PISC).

Four other specimens examined from AMS collections: 1♂, 1♀: **Australia**: Northmead, NSW, 26.I.1963, D. K. McAlpine (in bad conditions); 1♀: 10 mi. S. Forstet on E. bank of Wallis Lake/NSW, 3.III.68, G. A. Holloway; 1♂: Miriam Vale Distr., Creek W. of Eurimbula, Qld., 29.III.1975, D. K. McAlpine.

Remarks. Male and female genitalia give obvious specific indications to separate this species from all others.

Phylogeny and discussion

The genus *Trypetimorpha* is placed in the family Trepiduchidae although it has been first placed in Cixiidae (Costa, 1862) [but Trepiduchidae were recognized later

by Stål in 1866], in Issidae (Melichar, 1906: 51; Oshanin, 1912: 121) and in Fulgoridae (Horváth, 1907: 323; Ishihara, 1954). The main characters for this (autapomorphies for the family) being the apomorphical gonapophysis VIII (first valvula) conformation as mentioned by Asche (1988) and the lateral ends of the tentorial bridge (corpotorium) fused with the posterolateral wall of the head capsule (Bourgoin, 1986).

The special morphological aspect of the genus led Fieber (1872) to recognize for them a special status among the Fulgoromorpha in an isolated group: *Tripetimorphae* Fieber (1872: 4). The *Trypetimorphini* tribe was first keyed by Melichar in 1914, and was recently redefined by Fennah (1982) who placed in it four genera: *Ommatissus* Fieber, *Caffrommatissus* Fennah, *Trichoduchus* Bierman, and *Trypetimorpha* Costa. By this, the genus *Paruziela* Melichar, 1903, previously included in the *Trypetimorphini* (Melichar, 1914; Muir, 1923; 1930; Metcalf, 1938, 1954), was transferred to *Neommatissini* Fennah (1982). The genus *Remosa* Distant, 1906, first placed in *Peggiogini* Melichar (Melichar, 1914), then in *Tambiniini* Melichar 1914 (Metcalf, 1938) and finally in *Trypetimorphini* (Metcalf, 1954) was transferred to *Remosini* Fennah (1982). In a more recent study, Asche and Wilson (1989) synonymized *Trichoduchus* with *Trypetimorpha*, listing 9 species; 3 genera remained then in *Trypetimorphini*: *Trypetimorpha*, *Ommatissus* and *Caffrommatissus*.

The monophyly of each of the taxa can be established by the following autapomorphic characters.

In *Trypetimorpha* the unpaired lateral process of the periandrium (Bourgoin and Huang, 1990), the short tegmina epipleuron (Fig. 3), the presence of only one conspicuous claval vein in brachypterous forms are considered as autapomorphic characters for this genus. It is not certain that the character 'abdominal tergite separated into two hemitergites' represented an autapomorphy for the genus as such a conformation is not uncommon in other families. However, in *Tropiduchids*, *Ommatissus* (as at least 15 other genera where this character has been checked) show a normal conformation.

In *Ommatissus*, Asche and Wilson (1989) have pointed out the dark patches of frons and the lateral parts of the pronotum, and we retain also the special differentiated connection, or spermoductus (Bourgoin and Huang, 1991), between the bursa copulatrix and the vagina. Dark patches are also present in *Trypetimorpha* and *Caffrommatissus*.

The monospecific *Caffrommatissus* differs from both *Ommatissus* and *Trypetimorpha* by several plesiomorphies: the female genitalia of monotrysian condition (Bourgoin and Huang, 1991), the second antennal joint not produced anterodistally, the three carinated frontal area (apomorphy ?)—unicarinate in the two other genera—the absence of the mesoscutellum basal transverse groove and the 0 or 1 spined post-tibia. Only this last character could be considered as autapomorphic for the genus.

As for the reduction of veins in relation with brachypterous forms, as well as the absence of teeth on the third valvula (pointed out by Fennah, 1982) these could easily be convergent; we have been unable to find one synapomorphic character to justify the monophyly of *Trypetimorphini sensu* Fennah (1982). We agree with Asche and Wilson (1989) who were unable to assume a close relationship between the three remaining genera. If the grouping of *Ommatissus* and *Trypetimorpha* in the same tribe seems probable, no sure autapomorphy for this group has been found. Actually we retain only the character 'presence of special sensory and/or (?) glandular units

below the second metatarsomere' (Figs 4, 5). However, this character would have to be examined to see if it is absent in other genera. This clearly shows that more morphological comparative studies in Tropicuchidae are required before any more advanced phylogenetic conclusion.

In conclusion, we consider the Trypetimorphini *sensu* Fennah (1982) as paraphyletic, and we propose to restrict the tribe to the two genera *Trypetimorpha* and *Ommatissus* and to place *Caffrommatissus* in the tribe Cixiopsini Fennah, 1982, where in all genera the mesoscutellum is not divided from the mesonotum. However, this character is probably a symplesiomorphy for the tribe which is, more probably, paraphyletic.

With those two genera, Trypetimorphini are distributed in Palaearctic, Oriental and North Africa (*T. canopus*) areas, but also in Australia as illustrated by *T. wilsoni* described here. Biogeographically this occurrence is interesting, as very few tropiduchid genera are known from Australia.

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