

Review of the “red” Empoascini leafhoppers in the genera
Baguoidea Mahmood, 1967, *Dayus* Mahmood, 1967
and *Homa* Distant, 1908 (Hemiptera, Cicadellidae,
Typhlocybinae) from Asia and the West Pacific

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COUVERTURE / *COVER*:

Homa katoi Dworakowska, 1984 (paratype), dorsal habitus.

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ABSTRACT

The “red” Empoascini leafhoppers (Cicadellidae, Typhlocybinae), from Asia and the West Pacific, of the genera *Baguoidea* Mahmood, 1967, *Dayus* Mahmood, 1967 and *Homa* Distant, 1908 are reviewed. The following species and subspecies are treated: *Baguoidea rufa* (Melichar, 1903) from Sri Lanka and Myanmar, placed as a senior synonym of both *Baguoidea rubra* Mahmood, 1967 n. syn., from the Philippines and *B. yunnanensis* Qin & Zhang, 2010 n. syn., from China; *Dayus euryphaessus* (Kirkaldy, 1907) from Australia(?) and Fiji; *D. euryphaessus* ssp. *rubrocincta* (Linnavuori, 1960a) from Fiji; *D. formosus* Dworakowska & Viraktamath, 1978 from China (Hong Kong, new record; Taiwan) and India; *D. upoluanus* (Osborn, 1934) from Samoa; *Homa insignis* Distant, 1908 n. stat. (a species revalidated from synonymy with *H. haematoptila* (Kirkaldy, 1906)) from Sri Lanka, Myanmar (new record), China (new record) and Thailand (new record); *H. haematoptila* (Kirkaldy, 1906) from Australia (not Sri Lanka, Philippines, Thailand and China as recorded by Xu *et al.* 2022); *H. katoi* Dworakowska, 1984 from Malaysia including Sabah (new record); *H. rubrodorsata* Kato, 1933 from Taiwan; *H. sinensis* Qin & Zhang, 2011 from China. Checklists for all the species of *Homa* and *Dayus* are given, as well as a key for *Homa* species. Images are given for the first time for the types of *Baguoidea rubra*, *Dayus upoluanus*, *D. euryphaessus*, *D. euryphaessus* ssp. *rubrocincta* and *Homa haematoptila* and genitalia figures provided for the first time for *Dayus upoluanus* together with revised genitalia figures for *Homa insignis*, the same as given for *H. haematoptila* by Xu *et al.* (2022), in error.

KEY WORDS

Auchenorrhyncha,
Oriental region,
eighth abdominal
sternite apodemes,
Kiwi fruit,
new records.

RÉSUMÉ

Révision des cicadelles Empoascini “rouges” des genres *Baguoidea* Mahmood, 1967, *Dayus* Mahmood, 1967 et *Homa* Distant, 1908 (Hemiptera, Cicadellidae, Typhlocybinae) de l'Asie et du Pacifique ouest. Les cicadelles Empoascini “rouges” de l'Asie et du Pacifique ouest appartenant aux genres *Baguoidea* Mahmood, 1967, *Dayus* Mahmood, 1967 and *Homa* Distant, 1908 sont révisées. Les espèces et sous-espèces suivantes sont traitées : *Baguoidea rufa* (Melichar, 1903) de Sri Lanka et Myanmar, placée comme synonyme senior de *Baguoidea rubra* Mahmood, 1967 n. syn., des Philippines et de *B. yunnanensis* Qin & Zhang, 2010 n. syn., de Chine; *Dayus euryphaessus* (Kirkaldy, 1907) d'Australie(?) et des îles Fidji; *D. euryphaessus* ssp. *rubrocincta* (Linnavuori, 1960a) des îles Fidji; *D. formosus* Dworakowska & Viraktamath, 1978 de Chine (Hong Kong, nouvelle signalisation; de Taïwan) et de l'Inde; *D. upoluanus* (Osborn, 1934) de Samoa; *Homa insignis* Distant, 1908 n. stat. (une espèce ici sortie de sa synonymie avec *H. haematoptila* (Kirkaldy, 1906) et revalidée) du Sri Lanka, de Myanmar (nouvelle signalisation), de Chine (nouvelle signalisation) et de Thaïlande (nouvelle signalisation); *H. haematoptila* d'Australie (non du Sri Lanka, des Philippines, de Thaïlande ou de Chine comme l'ont rapporté Xu *et al.* [2022]); *H. katoi* Dworakowska, 1984 de Malaisie, y compris Sabah (nouvelle signalisation); *H. rubrodorsata* Kato, 1933 de Taïwan; *H. sinensis* Qin & Zhang, 2011 de Chine. Le liste des espèces de *Homa* et *Dayus* est fournie ainsi qu'une clé d'identification révisée pour les espèces de *Homa*. Des photos sont proposées pour la première fois pour les types de *Baguoidea rubra*, *Dayus upoluanus*, *D. euryphaessus*, *D. euryphaessus* ssp. *Rubrocincta* et *Homa haematoptila*; les genitalia sont illustrés pour la première fois pour *Dayus upoluanus*; et des figures révisées des genitalia de *Homa insignis* sont fournies, identiques à celles données par erreur pour *H. haematoptila* par Xu *et al.* (2022).

MOTS CLÉS
Auchenorrhyncha,
région orientale,
apodèmes du huitième
sternite abdominal,
kiwi,
signalisations nouvelles.

INTRODUCTION

Species of the leafhopper genera *Baguoidea* Mahmood, 1967 and *Homa* Distant, 1908 and some species of *Dayus* Mahmood, 1967 are mainly red in colour. This coloration makes them conspicuous elements of the Asian and Pacific fauna and readily noticeable in collections. All three genera belong to the “*Usharia* group” of Empoascini Distant, 1908. This group, first mentioned by Qin *et al.* (2011), also comprised the Asian genera, *Goifa* Dworakowska, 1977, *Ifugoa* Dworakowska & Pawar, 1974, *Treufalka* Qin & Zhang, 2008 and *Usharia* Dworakowska, 1977; later *Radicaefurcus* Qin & Zhang, 2010 was also included (Xu *et al.* 2021b: fig. 3). The group was defined by Xu *et al.* (2017: 468) by the unbranched MP+CuA vein in the hind wing (Fig. 3D); a solidly attached or fused aedeagus and connective (Fig. 3J) and in *Dayus*, *Homa* and *Ifugoa* the connective arms are also highly modified (Figs 4E; 5K). All genera also have all apical cells of the forewing arising from the m cell (Fig. 3C) with the 3rd apical cell petiolate in *Baguoidea* and *Dayus* (Fig. 3C) and the basal group macrosetae of the subgenital plate present, which are truncate apically in *Baguoidea* (Fig. 3L) and some *Homa* (Fig. 5F). In addition, all three genera have the ventral abdominal basal apodemes reduced, being replaced in *Baguoidea* and *Dayus* with long divergent dorsal basal apodemes (Fig. 3M), and in *Dayus* an unusual ventral apodeme of the 8th sternite is also present (Fig. 4F), see also Remarks under *Baguoidea* and *Dayus*. Previous figures of the basal abdominal apodemes in these genera have either incorrectly stated them as ventral or have not indicated their position. Qin *et al.* (2014) provided a key including all three genera and Xu *et al.* (2021b) a phylogeny of Empoascini.

The current work arose from identifying red marked typhlocybinae specimens from the West Pacific in the Natural History Museum, London collection, specimens which proved to be mainly new species of *Dayus* and *Homa*. All species of *Homa* have distinctive colour pattern (Fig. 1J) and the single species of *Baguoidea* and some species of *Dayus* are mainly red in colour; these genera and species are reviewed here and a key provided for their separation. A key to all Empoascini, including the “*Usharia* group” from China is given by Qin *et al.* (2014). The above three genera were included in the first major work on Oriental Typhlocybinae Kirschbaum, 1868 by Mahmood (1967), see ‘Discussion’. Other externally similar, predominantly reddish, Asian Empoascini include the following: *Alebroides rubicundus* Ishihara, 1953 (see Dworakowska 1997: 311, figs 726-731), *A. rubrus* Dworakowska, 1994b: 98, *Schizandrasca rubrifrons* (Matsumura, 1931) (Dworakowska 1982: 53, figs 259, 260), and males of *Alebrasca actinidia* Hayashi & Okado, 1994 (on Kiwi fruit), *Rubiparvus bistigma* Xu, Dietrich & Qin, 2016 (see Xu *et al.* 2016: 585, figs 1-4), *Nikkotettix galloisi* Matsumura, 1931 (see Dworakowska 1982, figs 268-275) and *N. taibaiensis* Qin & Zhang, 2003.

MATERIAL AND METHODS

“West Pacific” in the text refers to the region between and including Australia and the Philippines. Except where indicated, distribution records ending with (?) relate to records considered dubious by the authors.

ABBREVIATIONS

The specimens studied or referred to are deposited in the collections abbreviated in the text as follows:

EIHU	Entomological Institute of Hokkaido University, Sapporo;
INHS	Illinois Natural History Survey, Champaign,
NHM	The Natural History Museum, London;
NWAFU	Entomological Museum, Northwest A&F University, Yangling, Shaanxi;
QSBG	Queen Sirikit Botanical Garden, Chiang Mai;
USNM	United States National Museum, Washington.

TAXONOMY

CHECKLIST OF THE “RED” WEST PACIFIC GENERA

AND SPECIES OF THE “USHARIA GROUP” OF EMPOASCINI

Baguoidea rufa (Melichar, 1903); Sri Lanka, Myanmar, Philippines, China.

Baguoidea rubra Mahmood, 1967 **n. syn.**

Baguoidea yunnanensis Qin & Zhang, 2010 **n. syn.**

Dayus euryphaessus (Kirkaldy, 1907); Australia(?), Fiji

Dayus euryphaessus ssp. *rubrocincta* (Linnavuori, 1960a), Fiji

Dayus formosus Dworakowska & Viraktamath, 1978, India, China (Hainan, Hong Kong, new record and Taiwan)

Dayus upoluanus (Osborn, 1934), Samoa

Homa haematoptila (Kirkaldy, 1906); Australia (not Sri Lanka, Philippines, Thailand and China as recorded by Xu *et al.* [2022]).

Homa insignis Distant, 1908, n. stat., Sri Lanka, Myanmar (new record), China (new record), Thailand (new record)

Homa katoi Dworakowska, 1984; Malaysia, including Sabah (new record).

Homa rubrodorsata Kato, 1933; Taiwan.

Homa sinensis Qin & Zhang, 2011; China.

Family CICADELLIDAE Latreille, 1825

Genus *Baguoidea* Mahmood, 1967

Baguoidea Mahmood, 1967: 40. — Qin *et al.* 2010: 55; 2014: 1498 (key).

TYPE SPECIES. — *Baguoidea rubra* Mahmood, 1967 by original designation.

DISTRIBUTION. — Mainland Asia (Sri Lanka, Myanmar and China), Philippines and Japan(?), see Remarks of *B. rufa* below.

REMARKS

This monotypic genus is tentatively regarded as distinct from *Dayus*. It differs only in having the basal group setae of the subgenital plate blunt-tipped (also found in some *Homa* species) and distal macrosetae more numerous (Fig. 3L) and in lacking an unusual ventral apodeme of the 8th abdominal sternite, found in *Dayus*. In other respects, it is similar to *Dayus* in its overall red colour, having the 3rd apical cell in the forewing petiolate (Fig. 3C), male pygofer with processes (Fig. 3G), form of the subgenital plate and aedeagus and well developed male basal dorsal abdominal apodemes (Fig. 3M). The genus was redescribed by Yu & Yang (2013) as there were

some errors in Mahmood’s original description and figures, which also had implications on subsequent studies (see Remarks under *B. rufa* below). Yu & Yang (2013) also noted that Dworakowska (1973) had stated (and figured) that the facial laterofrontal sutures were absent in *Baguoidea* but were present in their specimens, and are also present in the specimens studied here. This apparent mistake by Dworakowska may have been due to the sutures being obscure against the red facial colour.

Baguoidea rufa (Melichar, 1903)

(Figs 1A-F; 3)

Empoasca rufa Melichar, 1903: 212, plate vi, fig. 2a, b. — Distant 1908: 402. — Metcalf 1968: 351 (see Remarks below).

Baguoidea rubra Mahmood, 1967: 42, plate 9, fig. 1. **n. syn.**

Baguoidea rufa – Dworakowska 1973: 49, figs 1-12, 15; 1994a: 5.

Baguoidea yunnanensis Qin & Zhang in Qin *et al.*, 2010: 55, figs 15-27. — Qin *et al.* 2014: 1495, figs 12, 46, 65, 94. **n. syn.**

DISTRIBUTION. — Mainland Asia (Sri Lanka, Myanmar and China), Philippines and Japan(?) see final comments in Remarks below.

MATERIAL EXAMINED. — **Sri Lanka** • 1 ♀; Peradeniya; IV.1906; Distant Coll; NHM.

Myanmar • 1 ♂; Myitta, Doherty; coll. Distant; NHM; parasitized • 1 ♂; Myitta, Doherty; coll. Distant; NHMUK 013588830.

Philippines • 1 ♂; Ifugao Prov., Luzon, Banaue; 20.VII.1980; NHM.

REMARKS

B. rufa was described from a single specimen from Sri Lanka with the following data (translated from the German): “Peradeniya. This nice Cicadine (1 ♂) was captured by Dr Uzel on 2 May 1903 in the Botanical Garden on the shrub *Dichopsis laevifolia* Benth. [= *Palaquium laevifolium* (Thwaites) Engl. (Sapotaceae)]”. As the recorded host plant in Sri Lanka is an endemic (critically endangered) species and as *B. rufa* is known from outside Sri Lanka it clearly feeds on other hosts. The specimens recorded from Myanmar by Distant (1908) are probably the same as examined here (Fig. 1E, F). *Baguoidea rubra* was described from the holotype male (Fig. 1C, D) and five paratypes (Fig. 1A, B) from the Philippines with data: “Baguio, Benguet, Baker” (USNM). The new synonymy of *B. rufa* and *B. rubra* is based on the type figures of the former given by Dworakowska (1973), the original description of the latter and images of its holotype sent by J. Zahniser (USNM) and the specimens studied. The differences between the two species, noted by Dworakowska (1973: 49), are either errors in the original description, i.e., Mahmood’s incorrect statement of forewings “mottled with red patches”, which are not present in the holotype images seen (see above) or an acceptable range of species variation, i.e., position of distal aedeagal processes; while the long pygofer processes figured by Mahmood for *B. rubra* is also probably an error. A specimen from Myanmar examined differs slightly in the male genitalia from the Sri Lanka type of *B. rufa* (figured by Dworakowska 1973) and the examined Philippine specimen

in having the pygofer process slightly more sinuate apically and in having the lateral fine setae adjacent to the macrosetal row shorter. The same setae are shown longer and greater in number in Qin *et al.*'s (2010) fig. 26 of the junior synonym *B. yunnanensis* (see reproduced figure here, Fig. 3L). The latter species was described from a single specimen from China and distinguished from *B. rufa* (and *B. rubra*, the other junior synonym of *B. rufa*) by the forewing colour (which according to all specimens seen is erroneous) and differences in pygofer and subgenital plate setae and spines at the apex of the aedeagal processes, all differences which fall within the accepted range of species variation. Genitalia figures drawn by Dworakowska (1973) were presumably taken from the holotype, as the only specimen examined, and as shown by Dworakowska's figs 7-9 the base of the aedeagus was damaged when dissected. However, the correct aedeagal base is shown in Fig. 3I (lateral view) and Fig. 3J (dorsal view) which matches the specimens examined here and which is remarkably similar to that of some *Dayus* species (see Fig. 4D). It should also be noted, that the subgenital plate basal group setae are dorsal (Fig. 3L) rather than ventral as shown in Dworakowska's (1973) figs 3, 4 and that the abdominal apodemes described by Qin *et al.* (2010), and shown in their figure 27 (and reproduced here, Fig. 3M), are dorsal, and are a feature of the genus (see generic Remarks). Finally, the references for Japan for this species by Esaki (1932, 1950), Esaki & Ito (1954) and Kato (1933b) need to be confirmed due to the similarity of some other red marked Empoascini (see Introduction). The reference of the species from Japan (Matsumura 1934) presumably refers to *Dayus takagii* Dworakowska, 1971, as this species was described from material in Matsumura's collection from Japan and also Hong Kong (see Remarks under *D. takagii*).

Genus *Dayus* Mahmood, 1967

Dayus Mahmood, 1967: 39. — Qin & Zhang 2007: 43. — Yu & Yang 2013: 2. — Qin *et al.* 2014: 1498 (key); 2021a: 229.

TYPE SPECIES. — *D. elongatus* Mahmood, 1967, by original designation.

DISTRIBUTION. — Widespread in Asia and the Pacific.

REMARKS

This genus is tentatively regarded as distinct from *Baguoidea* (see Remarks under that genus). It differs only in having the basal group setae of the subgenital plate not blunt-tipped and in having an unusual ventral apodeme of the 8th abdominal sternite with a pair of short anterior lobes (Fig. 4F), and also found here with a series of short setae at the posterior lateral corner of the 8th sternite. There is considerable variation among species in proportion of the vertex, size and colour, for example, in *Dayus formosus* the vertex is distinctly longer medially than next to eye but more or less the same in *D. trifurcatus* Yu & Yang, 2013 while the latter is yellow and not red as in some other congeners and very much bigger (two paratypes of *D. trifurcatus* [♂ and ♀] examined, NHM). A key to the Chinese species of the genus was given by Yu & Yang (2013).

CHECKLIST AND DISTRIBUTION OF *DAYUS* SPECIES

- D. bifurcatus* Yu & Yang, 2013: 3, figs 1-9. China (Zhejiang).
D. elongatus Mahmood, 1967: 39, plate 8, fig. 1. Malaysia (Singapore).
D. euryphaessus (Kirkaldy, 1907): 68. Fiji, Australia(?).
D. formosus Dworakowska & Viraktamath, 1978: 544, figs 33-41. India, China (Hainan, Hong Kong new record, Taiwan).
D. furcatus Xu, Dietrich & Qin, 2021a: 231, figs 10-17. Thailand.
D. lamellatus Qin & Zhang, 2007: 48, figs 22-31. China (Fujian, Zhejiang).
D. lii Qin & Zhang, 2007: 45, figs 1-12. China (Fujian).
D. membranaceus Qin & Zhang, 2007: 45, figs 13-21. China (Fujian, Jiangxi).
D. serratus Yu & Yang, 2013: 4, figs 24-30. China (Hainan).
D. takagii Dworakowska, 1971: 501, figs 1-11. China (Sichuan, Hong Kong, Taiwan), Japan.
D. trifurcatus Yu & Yang, 2013: 3, figs 10-23. China (Chongqing).
D. upoluanus (Osborn, 1934): 190, fig. 15. Western Samoa.

Dayus euryphaessus (Kirkaldy, 1907) (Fig. 2A-F)

Cicadula euryphaessa Kirkaldy, 1907: 68; 1908: 383.

Empoasca euryphaessa – Linnavuori 1960a: 17, Fig. 5f, h-j. — Evans 1966: 266 (misidentification(?) see Remarks below). — Wilson 2009: 46.

Empoasca euryphaessa rubrocincta Linnavuori, 1960a: 18. — Dworakowska 1971: 501. — Wilson 2009: 46.

Dayus euryphaessus – Dworakowska 1971: 501.

DISTRIBUTION. — Fiji, Australia(?) see Remarks below.

MATERIAL EXAMINED. — **Fiji** • 1 ♂; Labasa; R. Veitch; VII.1921; NHM • 1 ♀; Lautoka; W. Greenwood; 6.XII.1921; breeding on leaves of *Glochidion* sp.; NHM • 1 ♀; Loloti; W. Greenwood; 19.XII.1920; NHM.

REMARKS

This species was described from an unknown number of specimens (syntypic) from Fiji with data: "Viti Levu, Rewa (Mar.-Apr.) Navna (Feb. Muir's No. 53) on a native tree, also on *Saccharum officinarum*" (Sugarcane) (BPBM). The data label on an imaged specimen seen (BPBM) labelled both "type" and "Holotype", is as follows: "Fiji Is 1905 [printed] 53[handwritten]" (Fig. 2A, B). An image of four other syntype series specimens (labelled "Paratype") has been seen (BPBM). In its description Kirkaldy noted the following: "Allied to *C. rufa* (Melichar) [= *Dayus rufus*] but the head is longer, pronotum shorter, legs pale, etc. Bright scarlet, vertex pale testaceous with a medio-longitudinal suffused scarlet stripe, which forks at the base of the frons and extends all over the face suffusedly (sometimes the red stripe is obsolete at the fork, the frons then being entirely pale, only the genae and the clypeus, etc., red.)".



FIG. 1. — *Baguoidea* Mahmood, 1967 and *Homa* Distant, 1908 species: **A-F**, *Baguoidea rufa* (Melichar, 1903), **A**, **B**, paratype of *B. rubra* Mahmood, 1967, **A**, dorsal habitus, **B**, labels; **C**, **D**, holotype of *B. rubra* Mahmood, **C**, male genitalia (on mount), **D**, fore and hind wings on mount; **E**, dorsal habitus (non-type: Myanmar); **F**, labels of same; **G-I**, *Homa insignis* Distant, 1908 (lectotype), **G**, dorsal habitus; **H**, fore and hind wings on mount; **I**, labels; **J-K**, *Homa katoi* Dworakowska, 1984 (paratype), **J**, dorsal habitus, **K**, labels; **L-M**, *Homa haematoptila* (Kirkaldy, 1906) (holotype), **L**, dorsal habitus, **M**, labels. Scale bars: A, L, 1 mm; E, G, J, 2 mm.



FIG. 2. — *Dayus* Mahmood, 1967 species: **A-F**, *Dayus euryphaessus* (Kirkaldy, 1907). **A, B**, holotype, dorsal habitus and labels respectively; **C-F**, types *Empoasca euryphaessa rubrocincta* Linnavuori, 1960, **C, D**, allotype, dorsal habitus and labels respectively, **E, F**, holotype, dorsal habitus and labels respectively; **G-N**, *Dayus upoluanus* (Osborn, 1934), **G**, dorsal habitus of female paratype; **H**, labels of same; **I**, male basal dorsal apodemes; **J**, male pygofer, lateral view; **K** subgenital plate, ventral view; **L**, Xth segment, ventral view; **M**, aedeagus, lateral view; **N**, aedeagus, connective and style, ventral view. Scale bars: A, C, E, 0.75 mm; G, 2 mm.

Dworakowska (1971: 501) noted her placement of *D. euryphaessus* in *Dayus* was based on the original description, presumably its colour, proportions of the head and thorax and venation. In the original description it was also noted that the venation was similar to *Baguioidea rufa* and this is confirmed by Linnavuori's (1960a) redescription, which reads “third apical cell of elytra triangular and stalked” and the material examined here. However, the species is only tentatively retained in *Dayus* as the male genitalia show certain differences to that genus, i.e., the pygofer lacks a caudo-dorsal lobe, the subgenital plate lacks a basal setal group and the aedeagal shaft is very short without processes, all characters also found in the similar *D. upoluana*, although the aedeagus and connective are fused (Fig. 2N) and dorsal abdominal apodemes are present (Fig. 2I), as in other congeners.

Linnavuori (1960a) identified (and figured) *D. euryphaessus* from 29 specimens from Fiji, Lami, as part of a collection from Fiji sent to him by BPBM (see Introduction in Linnavuori 1960a) and not the type series, also BPBM (see above). The identification is however considered correct based on the distinctive marking of the species. It is also worth noting that Linnavuori's figure of the aedeagus is in lateral view, but its attached connective is shown in dorsal view, while his figure of long sternal abdominal apodemes are dorsal, as in other *Dayus* species.

Linnavuori (1960a) also described a new subspecies (*Empoasca euryphaessa rubrocincta*) from the holotype and allotype (BPBM) (Fig. 2C-F) and one paratype in his own collection, from the same locality as the nominate subspecies, Fiji, Lami. It seems strange that Linnavuori (1960a), when referring to his new subspecies, should say “As the nominate form...” as he described the red marking of the two subspecies differently, confirmed by the images reproduced here (Fig. 2A, C, E). However, his observation that the male genitalia were the same in the two subspecies, and their same type locality, suggests they are the same taxon with unaccountably different markings. In synonymising the two, Dworakowska (1971) noted the type-series of *Empoasca euryphaessa rubrocincta* had been studied but from personal communication a single specimen was studied.

The record of the species from Australia (Kuranda) by Evans (1966: 266), could be incorrect and could be the specimen of *Homa haematoptila*, from Kuranda, noted below.

Dayus formosus

Dworakowska & Viraktamath, 1978

Dayus formosus Dworakowska & Viraktamath, 1978: 544, figs 33-41. — Qin & Zhang 2007: 51.

DISTRIBUTION. — India, China (Hainan, Hong Kong new record), Taiwan.

MATERIAL EXAMINED. — **India** • 2 ♀; T. Nadu; Yercaud; I. Dworakowska det.; NHM.

China • 1 ♂; Hong Kong (new record); NHM.

REMARK

This species was described from the holotype male and one male, three female paratypes from India. An additional male from Taiwan was also recorded.

Dayus takagii Dworakowska, 1971

Empoasca rufa – Matsumura 1934: 5 (nec Melichar 1903, misidentification).

Dayus takagii Dworakowska, 1971: 501, figs 1-11. — Lee 1979: 565-566, plate 48, fig. 264, figs 528-530 (Korea). — Dworakowska 1982: 54, figs 282-288 (Japan). — Qin & Zhang 2007: 48, figs 32-40, China.

DISTRIBUTION. — Japan, Korea, China, Hong Kong(?) see Remarks below.

MATERIAL EXAMINED. — **Japan** • 1 ♀; Kyushu; Fukuoka; 10.I.1958; NHM.

REMARKS

This species was described from the holotype male and several paratypes (male and female) from Kyushu (Japan) and two female paratypes from Hong Kong. Although no depository for the types is indicated in the original description, it states in the acknowledgements to the paper that the type series was borrowed from EIHU, and this is presumed to be Matsumura's collection. Therefore, Matsumura's misidentification given in the original description (see above) refers to Matsumura (1934) where *Empoasca rufa* Melichar is listed from Japan and not (as stated) Matsumura (1931) where it is listed from Formosa. The female paratypes from Hong Kong could equally be *D. formosus* examined here from a male from Hong Kong and hence the question mark under Distribution. The colour of *D. takagii* was not originally described except that the species resembled *D. euryphaessus* but with paler coloration. The female tentatively identified here as this species (based on its locality Japan), is mainly reddish in colour.

Dayus upoluana (Osborn, 1934)

(Fig. 2G-N)

Homa upoluana Osborn, 1934: 190, fig. 15.

Empoasca (*Homa*) *upoluana* – Metcalf 1968: 442.

Dayus upoluana – Dworakowska 1971: 501. — Qin & Zhang 2007: 44.

DISTRIBUTION. — Samoa.

MATERIAL EXAMINED. — **Paratypes** • 2 ♂, 1 ♀, 1 specimen missing from mount; “Upolu Samoa”; “Apia, 9-15-23”; “Swezey & Wilder”; “Brit. Mus. 1930-467”; NHMUK 013588829 • 1 ♂; “Savaii, Samoa” “Safune, v.2.24”; “rain forest; 2000-4000”; “H. Bryan Jr”; “Brit. Mus. 1930-467”; NHM.

REMARKS

This species was described from 16 specimens of both sexes (holotype, allotype and paratypes) with original data: “Apia,

15.IX.1923 Swezey and Wilder” and two specimens, “Savaii, Safume, 2.V.1924, Rain Forest, 2000–4000 ft., Bryan”. In the introduction to Osborn’s article it states that type material collected by Swezey & Wilder and by Bryan was deposited in BPBM and duplicates in Ohio State University. However, some specimens of the former collectors are in the NHM (see Material examined), and from which the first images and male genitalia drawings of the species are given here (Fig. 2G–N).

Based on its male genitalia the species is only tentatively retained in *Dayus* as some diagnostic features of the genus are not present, i.e., the pygofer lacks a caudo-dorsal lobe, the subgenital plate lacks a basal setal group and the aedeagal shaft is very short without processes, all characters found in the similar *D. euryphaessus* (see above), although the aedeagus and connective are fused (Fig. 2N) and dorsal abdominal apodemes are present (Fig. 2I), as in other congeners.

Genus *Homa* Distant, 1908

Homa Distant, 1908: 400. — Mahmood 1967: 44. — Qin *et al.* 2011: 31 (description); 2014: 1498 (key). — Xu *et al.* 2022 (revision).

TYPE SPECIES. — *Homa insignis* Distant, 1908, by original designation.

DISTRIBUTION. — Widespread in Asia and the West Pacific.

REMARKS

Homa has similarities to both *Baguoidea* and *Dayus* (see Introduction and Remarks under those genera). It differs externally from these genera by its distinctive forewing colour marking (see Fig. 1H, J). Two additional characters to the generic description of Mahmood (1967) are the reduction or absence of male third basal abdominal sternal apodemes and the presence of a dorsal connective attached to the aedeagus in the phragma of the male pygofer. Mahmood (1967: 44) noted an undescribed species from the Philippines and here also the senior author has seen two undetermined female specimens from the Philippines (NHM) which, based on distribution, might possibly be *Homa katoi* Dworakowska, 1984. Several other new species from the Pacific (Sarawak, Brunei and Sulawesi) have also been seen (NHM). *Homa elongata* Kato, 1929 was transferred to *Asialebra* Dworakowska by Dworakowska (1993: 101). In the key to species by Qin *et al.* (2011), the last couplet should read *H. insignis* not *H. haematoptila* and in the key to species provided by Xu *et al.* (2022), similarly the reference to *H. haematoptila* should read *H. insignis* (for explanation see *H. haematoptila* below).

CHECKLIST AND DISTRIBUTION OF *HOMA* SPECIES

H. algulata Xu, Dietrich & Qin, 2022: 187–188. Thailand, Vietnam.

H. asilata Xu, Dietrich & Qin, 2022: 186–187. Thailand.

H. haematoptila (Kirkaldy, 1906). Australia (Queensland)

H. insignis Distant, 1908: 400 (type species). Sri Lanka, Myanmar(?), China, Thailand, see species Remarks below.

H. osificata Xu, Dietrich & Qin, 2022: 183–184. Thailand.

H. oretinia Xu, Dietrich & Qin, 2022: 184–185. Thailand.

H. katoi Dworakowska, 1984. Malaysia: Peninsular, Malacca, Sabah (new record)

H. rubrodorsata Kato, 1933a. China (Taiwan), Japan.

H. sinensis Qin & Zhang in Qin *et al.*, 2011: 32, figs 1–14. China, Thailand.

Homa haematoptila (Kirkaldy, 1906)

(Fig. 1L, M)

Eupteryx haematoptilus Kirkaldy, 1906: 362, plate 31, fig. 6. — Evans 1966: 267.

Cicadella haematoptila – Metcalf 1968: 685.

Homa haematoptilus – Dworakowska 1969: 487.

DISTRIBUTION. — Australia.

MATERIAL EXAMINED. — **Australia** • 1 ♀; Queensland; Kuranda; F. P. Dodd; VII.1904; *Homa haematoptila* det. I. Dworakowska; 1969; NHM.

REMARKS

Kirkaldy’s comments preceding his description that the “tegmina are unfortunately a little mutilated” suggests he had one specimen, the holotype, described as female with the following data: “Queensland, Redlynch (vii)”. This information matches the image of the type (now without abdomen), from BPBM, given here (Fig. 1L, M).

Dworakowska (1969) placed this species as a senior synonym of *H. insignis* but later (Dworakowska 1994a) treated *H. insignis* as a valid species but this was apparently overlooked by Xu *et al.* (2022) who treated it still as a senior synonym of *H. insignis*, without justification. In fact, as *H. haematoptila* is known only from the female from Australia its identity remains uncertain, although from the described forewing markings and venation it is correctly placed in *Homa* and matches the female specimen examined here from Australia, Kuranda and some new species of *Homa* seen from the Pacific (NHM). The former specimen from Kuranda could represent the record of *Dayus euryphaessus* from Kuranda, by Evans (1966: 266). According to Murray Fletcher (pers. com.), the Redlynch type was collected as part of the Bishop Museum’s visit to Australia by Koebele and Perkins in 1904, which started Kirkaldy’s study of the Australian fauna.

Homa insignis Distant, 1908 (status revived)

(Figs 1G–I; 6)

Homa insignis Distant, 1908: 400, fig. 248. — Matsumura 1931: 80, fig. 4. — McAtee 1934: 102, plate 3, figs 26, 27. — Mahmood 1967: plate 10, figs 2a–2e.

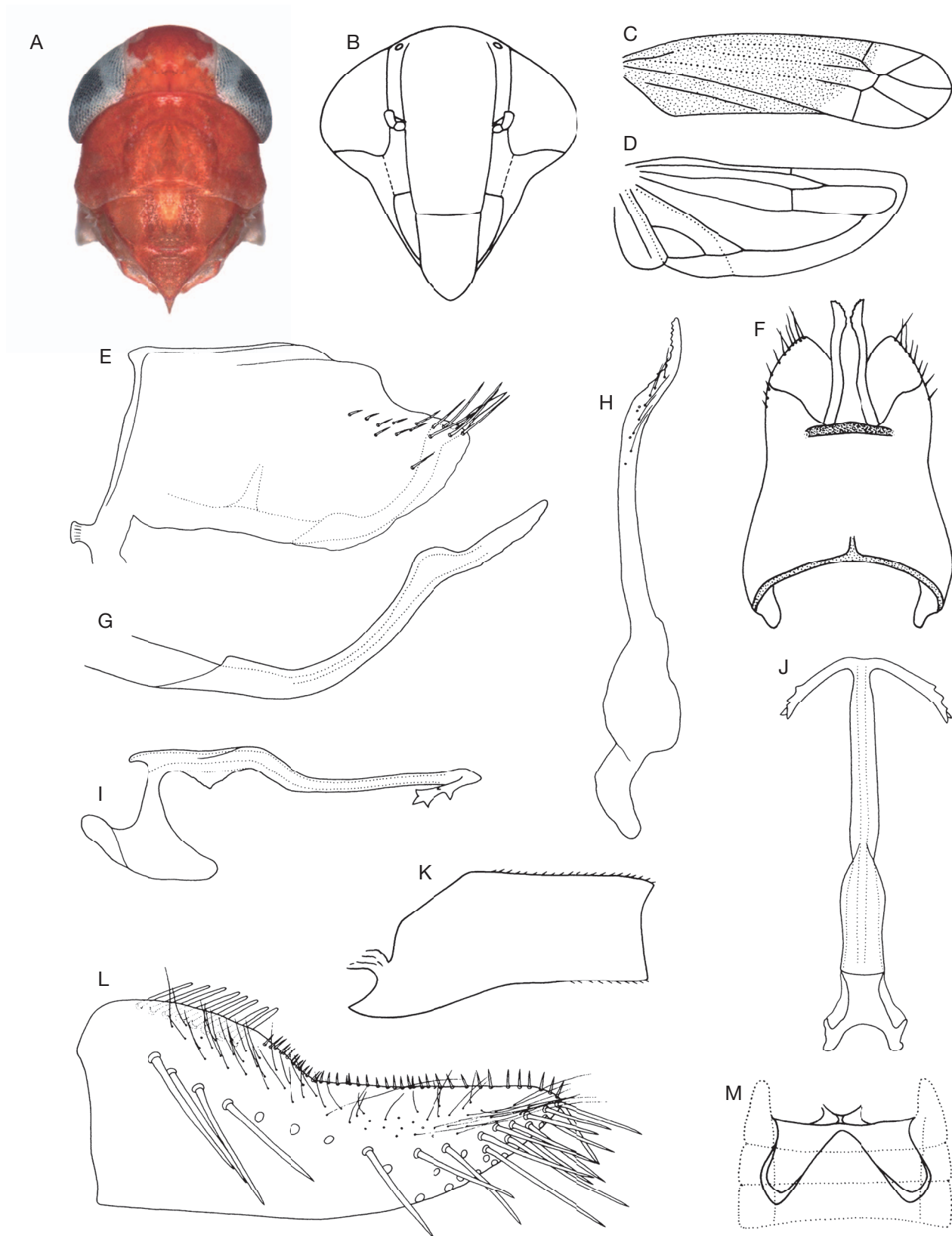


FIG. 3. — *Baguoidea rufa* (Melichar, 1903) (from types of junior synonym, *B. yunnanensis* Qin & Zhang, 2010): **A**, Head and thorax, dorsal view; **B**, face; **C**, forewing; **D**, hind wing; **E**, male pygofer, lateral view; **F**, male pygofer, dorsal view; **G**, male pygofer internal process; **H**, style; **I**, aedeagus and connective, lateral view; **J**, same, ventral view; **K**, male anal tube, lateral view; **L**, subgenital plate; **M**, male dorsal abdominal apodemes. Reproduced from Qin *et al.* (2010: figs 15–27), with permission from copyright holder.

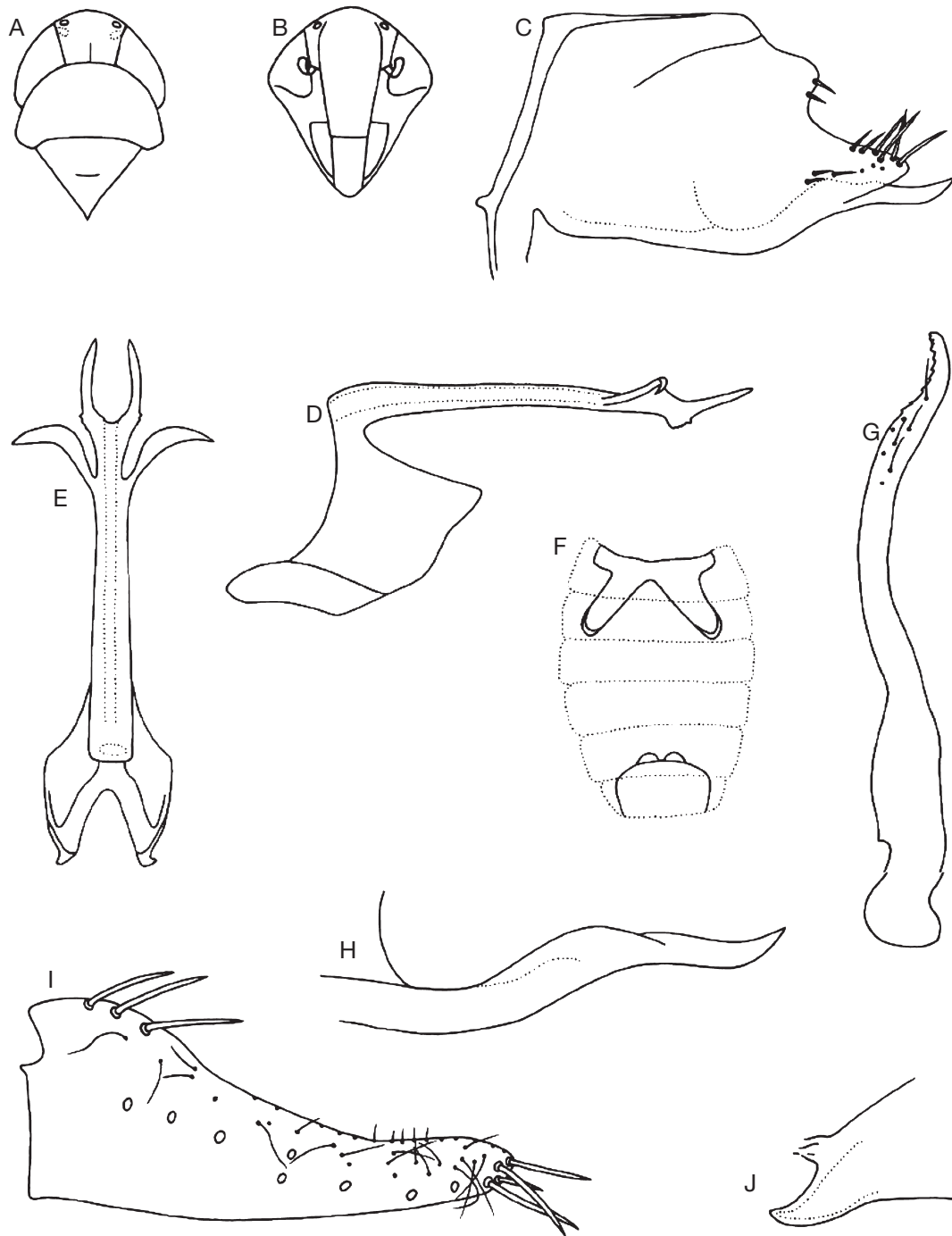


FIG. 4. — *Dayus lamellatus* Qin & Zhang, 2007: **A**, head and thorax, dorsal view; **B**, face; **C**, male pygofer, lateral view; **D**, aedeagus and connective, lateral view; **E**, aedeagus and connective, ventral view; **F**, male abdominal apodemes of third tergite (upper) and 8th sternite (lower); **G**, style; **H**, male pygofer internal process; **I**, subgenital plate, ventral view; **J**, male anal tube process, lateral view. Reproduced from Qin & Zhang (2007, figs 22–29), with permission from copyright holder.

Empoasca (Homa) insignis – Metcalf 1968: 441.

Homa insignis – Dworakowska 1969: 487 (placed as junior synonym of *H. haematoptila* in error); 1994a: 6. — Xu *et al.* 2022: 181 (placed as a junior synonym of *H. haematoptila* in error).

DISTRIBUTION. — Sri Lanka, Thailand and China (new records) and India (?), see Remarks below.

MATERIAL EXAMINED. — **Lectotype**. Sri Lanka • ♂ (see Remarks); Sri Lanka: Peradeniya; V.1905; Distant coll.; NHMUK 013588831. **India** • 1 ♀; Mishmi Hills; Delei River; 1700'; 7.II.1935; M. Steele; NHM.

Thailand • 10 ♂; Nakhon Nayok Khao Yai NP; behind football field; 14°24.619'N, 101°22.778'E; 770 m a.s.l.; malaise trap; 5–12. VII.2006; Pong Sandao leg. T142; INHS, QSBG.

China • 1 ♂; Yunnan, Jinghong, Wild Elephant Valley; 29.IV–4.V.2017, coll. Ye Xu; NWAUFU.

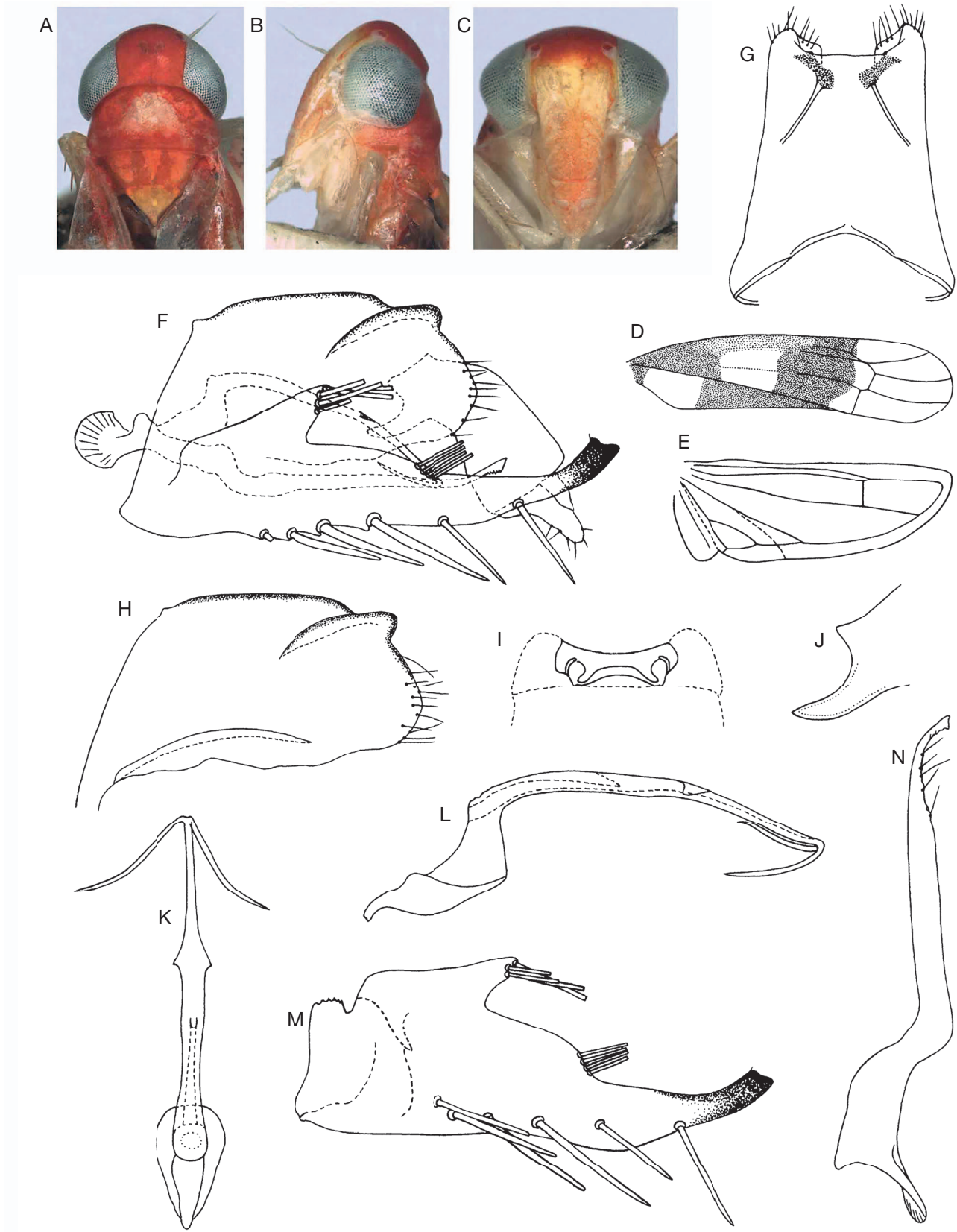


FIG. 5. — *Homa sinensis* Qin & Zhang, 2011: **A**, head and thorax, dorsal view; **B**, same lateral view; **C**, face; **D**, forewing; **E**, hind wing; **F**, male genital capsule, lateral view; **G**, male pygofer, dorsal view; **H**, male pygofer, lateral view; **I**, male basal abdominal apodemes; **J**, male anal tube process, lateral view; **K**, aedeagus and connective, dorsal view; **L**, aedeagus and connective, lateral view; **M**, subgenital plate, ventral view; **N**, style. Reproduced from Qin *et al.* (2011, figs 1-13), with permission from copyright holder.

REMARKS

This species was described from an unknown number of specimens (syntypic) with the following data: “Ceylon; Peradeniya (Green)”. Mahmood (1967) redescribed the species based on “the type” (and therefore is deemed to have designated the lectotype by inference, see ICZN 1999, Article 74.6). Although the male genitalia of the lectotype are now missing they were figured by Mahmood (1967) and although with certain inaccuracies, Mahmood’s figures are sufficient to identify the genus (see Qin *et al.* 2011: 31). Identification of *Homa insignis* from Mahmood’s poor figures is more problematical but the Asian specimens examined here (see Fig. 6) are correctly identified considering that Mahmood’s aedeagus figure is not lateral (as originally stated) but ventral, and the basal processes (as originally described and figured), are absent and possibly mistaken for the gonoduct. The specimen from India (Mishmi Hills), being female, is only tentatively identified as this species (and hence the question mark under Distribution), but the reference to the species from Lombok (Indonesia) by Jacobi (1941: 312) cannot be considered reliable. Dworakowska (1969) placed this species as a junior synonym of *H. haematoptila* but later (Dworakowska 1994a) treated *H. insignis* as a valid species but this was apparently overlooked by Xu *et al.* (2022) who treated it still as a senior synonym of *H. insignis*, without justification (see Remarks under *H. haematoptila*).

Figures of the type by McAtee (1934, pl. 3, fig. 26) indicate that it was probably he that made the wing mount (Fig. 1I) and presumably corrected the poorly preserved jugal lobe (Fig. 1H) in his drawing of the hind wing. The latter defect was probably that referred to by Matsumura (1932) in the following way: “After studying the somewhat defect hind wing of this species in the British Museum, the author found that the genus belongs to the group *Empoascaria*, the first and second veins being uniting, and at the point of the uniting a cross-vein sent straightly downwardly, the third vein simple, stronger till the cross-vein; the cross-vein of the elytron at the dorsum straight”.

Homa katoi Dworakowska, 1984
(Fig. 1J, K)

Homa katoi Dworakowska, 1984: 12, figs 148–161. — Xu *et al.* 2022: 180 (key).

DISTRIBUTION. — Malaysia: Peninsular, Malacca, Sabah (new record).

MATERIAL EXAMINED. — **Holotype.** Malaysia • ♂; Malay Peninsula: Perak; Taiping; 8.XI.1943; R. Takahashi; NHM.

Paratypes. Malaysia • 1 ♂, 4 ♀, 1 specimen with abdomen missing; Malay Peninsula: Perak, Taiping; 8.XI.1943; R. Takahashi; NHM • 1 ♀; Malay Peninsula: Kuala Lumpur; 7.VIII.1931; on *Solanum melongena* (Aubergine); NHMUK 013588832

Non-types. West Malaysia • 1 ♂, 6 ♀, 1 immature; Malacca, Alor Gajah; 28.VIII.1989; on cocoa; NHM • 1 ♀; same data; 17.VII.1989; NMHUK 013387440 • 1 ♂, 5 ♀; Sabah; A.R.C. Tuaran; 22.V.1973; on castor oil; NHM.

REMARKS

In the original description of this species part of the legend is missing but communication with the author (Dr Dworakowska) indicates that the apodemes in her fig. 61 might be dorsal or ventral. The species is newly recorded from Sabah.

Homa rubrodorsata Kato, 1933

Homa rubrodorsata Kato, 1933a: 452, plate 15, fig. 26; 1933b: pl. 30, fig. 5. — Xu *et al.* 2022: 188, figs 78–80.

Empoasca (*Homa*) *rubrodorsata* – Esaki & Ito 1954: 22.

DISTRIBUTION. — Taiwan, Japan (see Remarks).

MATERIAL EXAMINED. — No material examined.

REMARKS

The identity of this species, described from Japan and Taiwan is uncertain as it is known only from a female type and males are needed for species identification. However, from the figures given by Kato (1933a, b) and images of a type given by Xu *et al.* (2022) taken by Dr Masami Hayashi from the Kato family collection (Japan), the marking on the forewings indicate it is correctly placed in *Homa*.

Homa sinensis Qin & Zhang
(Fig. 5)

Homa sinensis Qin & Zhang in Qin *et al.*, 2011: 32, figs 1–14. — Xu *et al.* 2022: 189, figs 81–85.

DISTRIBUTION. — China.

MATERIAL EXAMINED. — No material examined.

DISCUSSION

The three genera treated here were included in the first major work on Oriental Typhlocybae by Mahmood (1967). In his work, Mahmood described several (mostly new) genera and gave the most detailed descriptions and figures of the male genitalia up to that time. Information on Mahmood’s study and the material he examined comes from various sources in his publication. He worked for one year at North Carolina State College with Dave Young (of later Cicadellinae fame), whom he thanked in the Introduction (p. 1) and under Acknowledgements (p. 5), for suggesting the project. In the Acknowledgements, he also thanked James P. Kramer, for loaning Baker material from the USNM and thanked W.E. China for help during a visit to the NHM, where he studied most of Distant’s Indian types (p. 3). Other material Mahmood studied is alluded to under the remarks of various genera and species including the three genera studied here. For example, in addition to the type (and the only species at that time) of *Homa* (*H. insignis* Distant) he also noted he had seen another species of the genus from the Philippines and when describing a single species of *Dayus* (*D. elongatus*

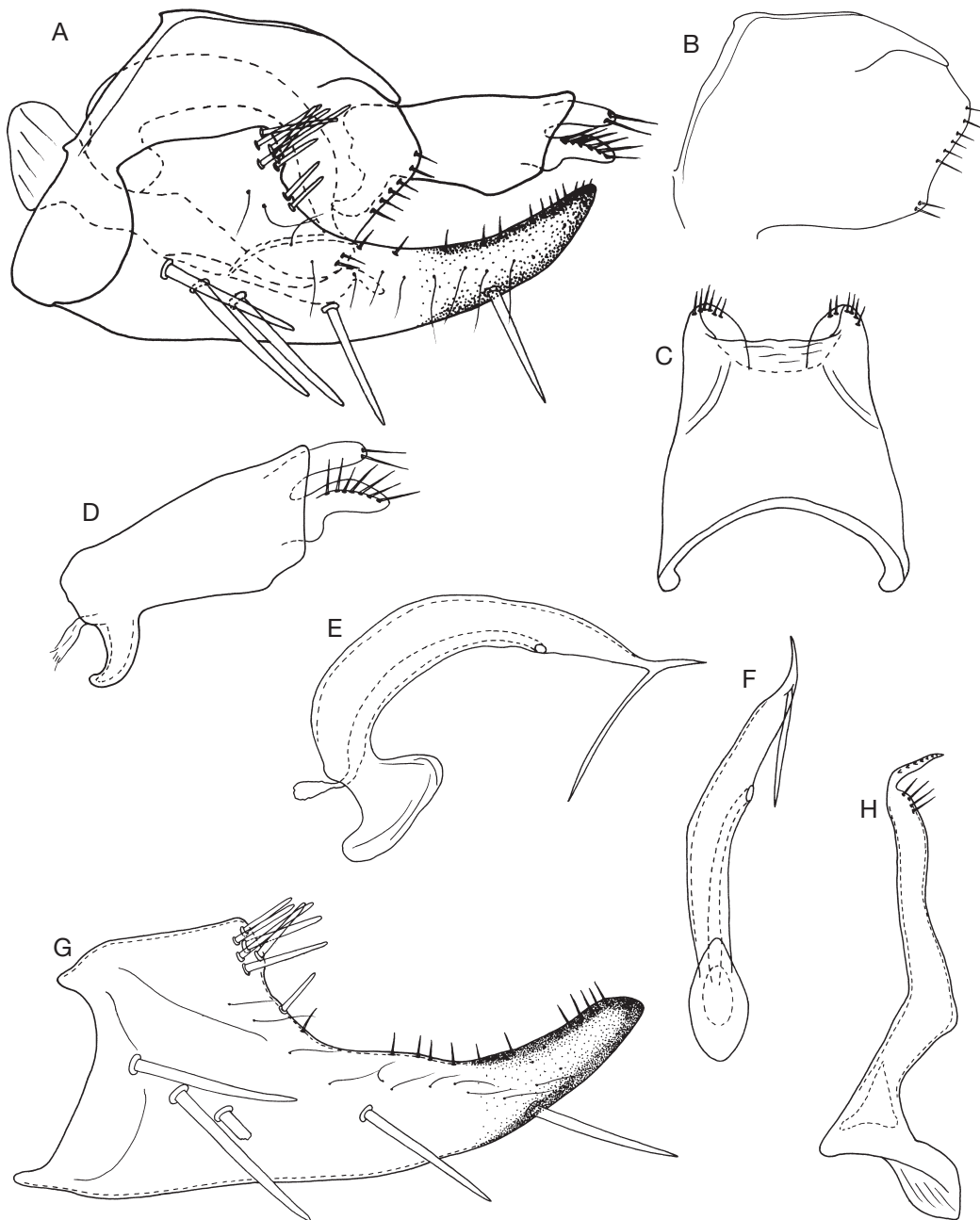


FIG. 6. — Male genitalia of *Homa insignis* Distant, 1908 from Thailand specimen: **A**, genital capsule; **B**, pygofer, lateral view; **C**, pygofer, dorsal view; **D**, anal tube, lateral view; **E**, aedeagus and connective, lateral view; **F**, aedeagus and connective, ventral view; **G**, subgenital plate, lateral view; **H**, style. Reproduced from Xu *et al.* (2022, figs 38-45) (as *H. haematoptilus*, misidentification), with permission from copyright holder.

Mahmood) he noted “the genus is known from four [undetermined] species” from Singapore, Philippines and Island of Penang (Malaysia) and similarly, when describing *Baguoidea* he noted an undetermined species from Penang (Malaysia). He also stated in his Introduction (p. 2) that he had studied material from Pakistan, India, Thailand and Borneo. The whereabouts of all the undetermined material noted above was not stated by Mahmood but the depository of all types of his described species was given as USNM. The type series

of *Baguoidea rubra* Mahmood (the species studied here) is present in the USNM and interestingly the paratypes have a NHM yellow type disc (Fig. 1B) indicating perhaps that Mahmood took the discs when visiting the museum.

Other visitors to the NHM working on Typhlocybinae were noted by McAtee (1934: 94) and included himself in 1927 and Matsumura in 1932, the latter commenting on Distant’s genera in Matsumura (1932: 190-191). See also under final Remarks of *Homa insignis*.

KEY TO THE “RED” ASIAN AND WEST PACIFIC GENERA AND SPECIES OF THE “USHARIA GROUP” OF EMPOASCINI

Note. Two species, known only from the female, i.e., *Homa haematoptilus* (Kirkaldy, 1906) from Australia and *Homa rubrodorsata* Kato, 1933 from Taiwan, are excluded from the key pending examination of the male.

1. Forewing reddish in basal half to two-thirds (Fig. 1A, E) or with a ‘T’ shaped red mark (Fig. 2E); third apical cell petiolate (Fig. 3C); male pygofer with a ventral process; subgenital plate slightly produced basolaterally but without a distinct lobe (Figs 3L; 4I); aedeagal shaft elongate or very short 2
 - Forewing marked with red in corium basally, along clavus distally and continued across wing (Fig. 1H, J); third apical cell not petiolate (Fig. 5D); male pygofer without a ventral process; subgenital plate with a distinct basolateral lobe (Figs 5F; 6A); aedeagal shaft elongate (*Homa* Distant, 1908) 5
 - Subgenital plate basal group macrosetae truncate apically; lateral macrosetae uniseriate and few in number in basal two thirds, irregularly arranged and numerous in distal third (Fig. 3L); aedeagal shaft elongate (Fig. 3I); male 8th abdominal sternite without apodeme *Baguoidea rufa* (Melichar, 1903)
 - Subgenital plate basal group macrosetae acute apically, lateral macrosetae uniseriate throughout and few in number (Fig. 4I); male 8th abdominal sternite with apodeme (Fig. 4F) (*Dayus* Mahmood, 1967) 3
2. Aedeagal shaft very long with a pair of apical subparallel processes (see Dworakowska & Viraktamath, 1978, fig. 36); India, China (Hainan, Taiwan and Hong Kong) *Dayus formosus* Dworakowska & Viraktamath, 1978
 - Aedeagal shaft very short without a pair of apical processes 4
3. Aedeagal shaft evenly curved in lateral view (Fig. 2M); Samoa *Dayus upoluanus* (Osborn, 1934)
 - Aedeagal shaft angularly curved in lateral view (see Linnavuori 1960: fig. 5i); Fiji *Dayus euryphaessus* (Kirkaldy, 1907)
4. Subgenital plate with latero-basal lobe narrow, with group of lateral macrosetae near midlength (Fig. 5M); China *Homa sinensis* Qin & Zhang, 2011
 - Subgenital plate with latero-basal lobe broad, without group of lateral macrosetae near midlength (Fig. 6G) 6
5. Aedeagal shaft relatively broad in lateral view (Fig. 6A); mainland Asia *Homa insignis* Distant, 1908
 - Aedeagal shaft very narrow in lateral view (see Dworakowska 1978: fig. 54); Malaysia *Homa katoi* Dworakowska, 1984

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