

Illustrated key to the families and genera of planthoppers (Homoptera: Fulgoroidea) from the New Zealand sub-region

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Abstract

Illustrated keys are given to the 7 families (Achilidae, Cixiidae, Delphacidae, Derbidae, Dictyopharidae, Flatidae, Ricaniidae) and 26 genera of Fulgoroidea recorded from the New Zealand sub-region. Lectotypes are designated for *Agandecca annectens* F.B. White (Achilidae) and *Semo clypeatus* F.B. White (Cixiidae).

INTRODUCTION

Wise (1977) listed 7 families, 26 genera, and 42 species of planthoppers (superfamily Fulgoroidea) for the New Zealand sub-region (including the Chatham and Kermadec

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Islands). Of these, 12 genera and 33 species are endemic. A few species are sometimes considered to be plant pests: the green planthopper, *Siphanta acuta* (Walker) (Figs 9, 10); the grey planthopper, *Sephena cinerea* Kirkaldy (Figs 7, 8); the flax planthopper, *Oliarus atkinsoni* Myers (Figs 18, 24); and the passionvine hopper, *Scolypopa australis* (Walker) (Fig. 3) (Cumber 1952a-1967; Deitz in press; Myers 1922a, b). The flax planthopper is a native of New Zealand, but the other three pest species were originally natives of Australia. The passionvine hopper is of special concern here, being occasionally involved in the production of poisonous honey (Palmer-Jones *et al.* 1947). This poisoning may occur if bees collect toxic honeydew excreted by passionvine hoppers feeding on the endemic tree "tutu", *Coriaria arborea* Lindsay.

More precise information is needed concerning host specificity and distribution of the New Zealand species. Although most planthoppers feed on the phloem of flowering plants, some apparently feed on fungi (derbids) or ferns, e.g., the longheaded bracken hopper, *Thanatodictya tillyardi* Myers; Fig. 2. Delphacids are often associated with grasses, sedges, or rushes, and nymphal cixiids are often root-feeders.

Planthoppers differ from similar Homoptera (cicadas, leafhoppers, spittlebugs, and treehoppers) in having the following combination of characters: the ocelli and antennae are lateral rather than frontal (Figs 3, 6, 8, 10), the antennae being ventral of the compound eyes (Figs 3, 6, 8, 10, 15-23, 35-40); the metathorax has well-separated, elongate coxae and usually has tegulae (scale-like structures) over the wing bases (Figs 2, 3, 6, 8, 10, 12, 14, 24, 25, 41, 44); and in the forewings, the anal (claval) veins are often confluent distally (Figs 2, 12, 14, 24, 25, 41). Myers (1923, 1924, 1927) and Fennah (1950, 1965, 1975) contributed much to the systematics of the New Zealand genera and species, but some groups (notably Achilidae and Cixiidae) still include undescribed species, making it difficult to apply existing specific names with certainty.

The keys and illustrations below are based almost entirely on specimens collected in New Zealand. Except as noted in the acknowledgments, the specimens are housed in the New Zealand Arthropod Collection, Entomology Division, DSIR, Auckland. Several characters used in Fennah's (1965) key to the genera of Delphacidae from Australia and New Zealand appear to be unsatisfactory for separating New Zealand material: numerous specimens of *Nilaparvata myersi* Muir lack lateral spines on hind tarsomere I (Fig. 48), members of the genus *Anchodelphax* Fennah may have more than 13 teeth on the hind tibial spur, and certain proportions of the vertex (Figs 42-44) and frons used by Fennah may not hold for all members of the included genera. The present key includes features of the male genitalia to separate these and other taxa in which the established characters are unsuitable. Nevertheless, the characters used here to separate the New Zealand species of *Cixius* Latreille (Cixiidae) and *Toya* Distant and *Nilaparvata* Distant (Delphacidae) may not be representative of the other members of these genera.

Helmore prepared all the illustrations except those of genitalia which are by Deitz. For terminology see Figs 10 and 52. The hind wings were omitted in Figs 3 and 24 to keep the forewing venation clear. We noted a minute, median ocellus or its remnant in *Confuga persephone* Fennah (Fig. 15) which had not previously been observed (Fennah 1975).

LECTOTYPE DESIGNATIONS

Lectotypes are designated here to define the type-species of *Agandecca* F.B. White, 1879, and *Semo* F.B. White, 1879. In quoting the labels of specimens designated as lectotypes, the word "and" separates individual labels and a virgule (/) separates individual lines.

Achilidae:

Agandecca annectens F.B. White, 1879, *Entomol. Mon. Mag.* 15: 218 (type-species of *Agandecca* White, 1879, by original designation and monotypy). A male specimen (total length 4.9 mm, width 1.8 mm; Figs 12, 13) in the F.B. White collection, Perth Museum and Art Gallery, Scotland, is here designated lectotype. It bears labels: "NZ/H" [the bottom of the 'H' is cut off] and "LARGE CABINET/CASE 32" and "BUCHANAN WHITE COLLⁿ./PERTH MUSEUM/1979.3.48" and "LECTOTYPE ♂ /*Agandecca*/annectens/F.B. White/desig. L L Deitz 1979." This male appears to be conspecific with a female (paralectotype) which bears a pencil label "*Agandecca annectens*" supplied by White. The only other specimen in the type-series labelled "*Agandecca annectens*" by White is a larger female (5.9 mm long), apparently representing an undescribed species of *Agandecca*. Curiously, Fennah (1950:83) illustrated a specimen which he referred to as the "holotype" of *A. annectens*.

Cixiidae:

Semo clypeatus F.B. White, 1879, *Entomol. Mon. Mag.* 15: 217 (type-species of *Semo* White, 1879, by original designation and monotypy). A male specimen (total length 4.2 mm, width 1.7 mm; Figs 23, 25, 31, 32) in the F.B. White collection, Perth Museum and Art Gallery, Scotland, is here designated lectotype. It bears labels: "N.Z/H" and "LARGE CABINET/CASE 32" and "BUCHANAN WHITE COLLⁿ./PERTH MUSEUM/1979.3.77" and "*Semo clypeatus*" (the last supplied by White) and "LECTOTYPE ♂ /*Semo*/clypeatus/F.B. White/desig. L L Deitz 1979."

**KEY TO FAMILIES AND GENERA
OF NEW ZEALAND FULGOROIDEA (ADULTS)**

1. Hind tibia with large movable spur apically (Figs 41, 45-48); brachypterous (short-winged; Fig. 41) or macropterous (large-winged) forms **DELPHACIDAE** p.14
 - Hind tibia without large movable spur (Figs 4, 11, 26); macropterous forms (Figs 2, 3, 6, 8, 10, 12, 14, 24, 25) 2
2. Hind tarsomere II with truncate or emarginate apex bearing row of 3 or more spines (Fig. 26) 3
 - Hind tarsomere II small with rounded or acute apex bearing at most 1 ablatral and 1 adlatral spine (Figs 4, 11) 6
3. Rostrum (labium) with apical segment short (less than 2 × longer than wide; Figs 5, 6) **DERBIDAE** (*Eocenchrea* Muir)
 - Rostrum with apical segment elongate (greater than 4 × longer than wide; Fig. 1) 4
4. Forewings overlapping apically in repose, anal veins extending to apex of CuP (Figs 12, 14) **ACHILIDAE**, p.14
 - Forewings not overlapping in repose, anal veins extending to margin before apex of CuP (Figs 2, 24, 25) 5
5. Head greatly prolonged anteriorly (Fig. 2) **DICTYOPHARIDAE** (*Thanatodicyta* Kirkaldy)
 - Head not greatly prolonged anteriorly (Figs 24, 25) **CIXIIDAE**, p.14
6. Hind tarsomere II with 1 ablatral and 1 adlatral spine apically (Fig. 11); forewing granulate between anal veins (Figs 8, 10) **FLATIDAE**, p.18
 - Hind tarsomere II without spines apically (Fig. 4); forewing not granulate between anal veins (Fig. 3) **RICANIIDAE** (*Scolypopa* Stål)

KEY TO GENERA OF ACHILIDAE

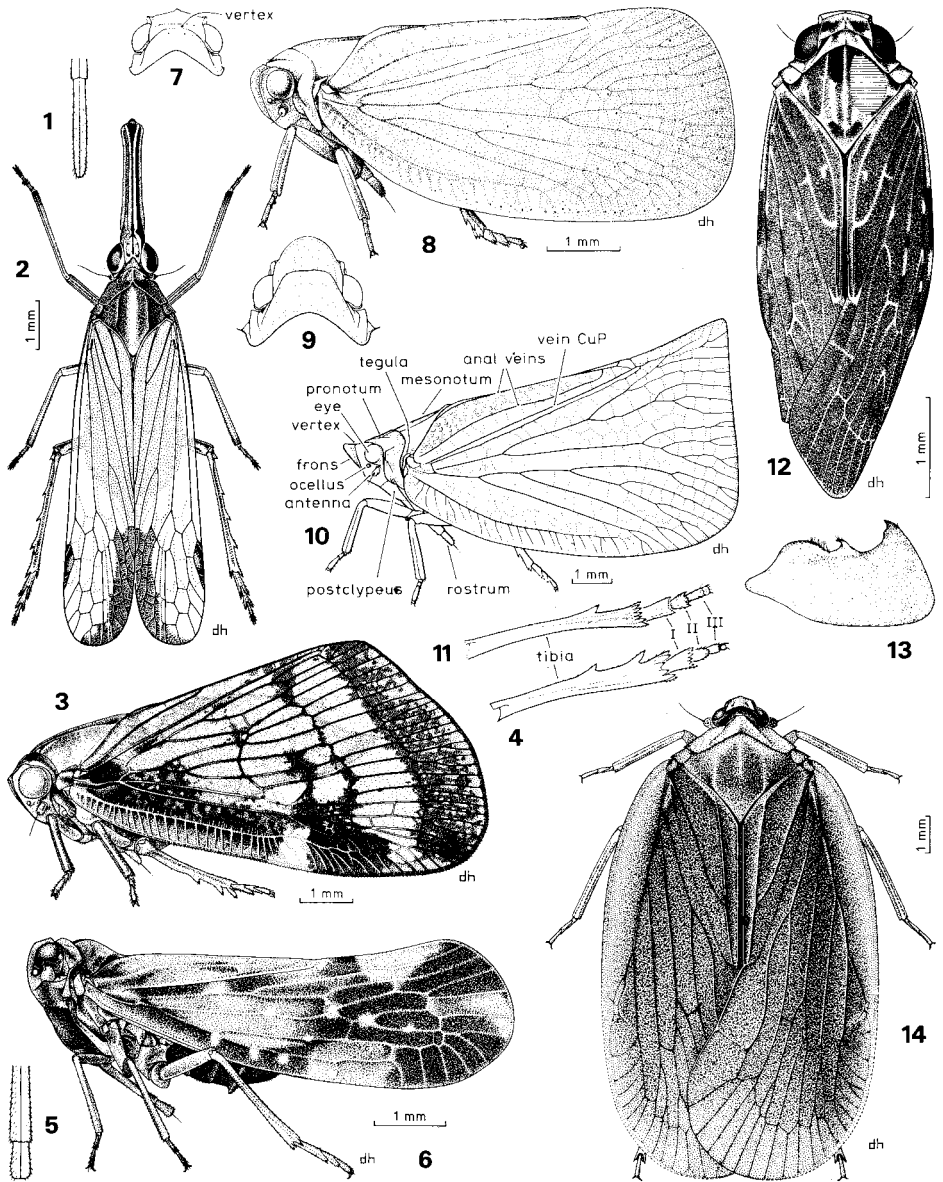
1. Vertex width less than $0.5 \times$ pronotal width (Fig. 14), disc not depressed, anterior margin without transverse carina and lateroapical facets; colour red
..... *Achilus* Kirby
- Vertex width at least $0.6 \times$ pronotal width (Fig. 12), disc depressed, anterior margin with 2 transverse carinae which enclose lateroapical facets; colour mostly brown
..... *Agandecca* F.B. White

KEY TO GENERA OF CIXIIDAE

1. Eyes greatly reduced (Fig. 15)..... *Confuga* Fennah
- Eyes not greatly reduced (Figs 16-25)..... 2
2. Frons without longitudinal carina medially (Figs 22, 23)..... 3
- Frons with longitudinal carina medially (Figs 16-21)..... 4
3. Postclypeus swollen (Fig. 23); mesonotum with 3 longitudinal carinae, median carina occasionally indistinct (Fig. 25)..... *Semo* F.B. White
- Postclypeus not swollen (Fig. 22); mesonotum with 5 longitudinal carinae
..... *Huttia* Myers
4. Frons with median longitudinal carina straight, not forked or thickened near mid-length (Figs 18-21)..... 5
- Frons with median longitudinal carina forked or thickened near mid-length (Figs 16, 17)..... 8
5. Hind tibia with 1 or more conspicuous spines laterally (Fig. 26); frons truncate apically (Figs 18-20)..... 6
- Hind tibia without spines laterally; frons rounded apically (Fig. 21)
..... *Tiriteana* Myers
6. Mesonotum black, with 5 longitudinal carinae (Fig. 24)..... *Oliarus* Stål
- Mesonotum not black, with only 3 longitudinal carinae..... 7
7. Frons brown medially, lateral margins pale and slightly sinuate in outline (Fig. 20); aedeagus with twisted appendages (Fig. 30)..... *Koroana* Myers
- Frons various in colour, lateral margins nearly straight in outline (Fig. 19); aedeagus with branched or simple, untwisted appendages (Figs 27-29) .. *Cixius* Latreille
8. Male styles (claspers or paromeres) with dorsal process apically (Fig. 33); hind tibia with 1 or more conspicuous lateral spines..... *Malpha* Myers
- Male styles broadly spatulate and without process apically (Fig. 34); hind tibia with lateral spines inconspicuous or lacking..... *Aka* F.B. White

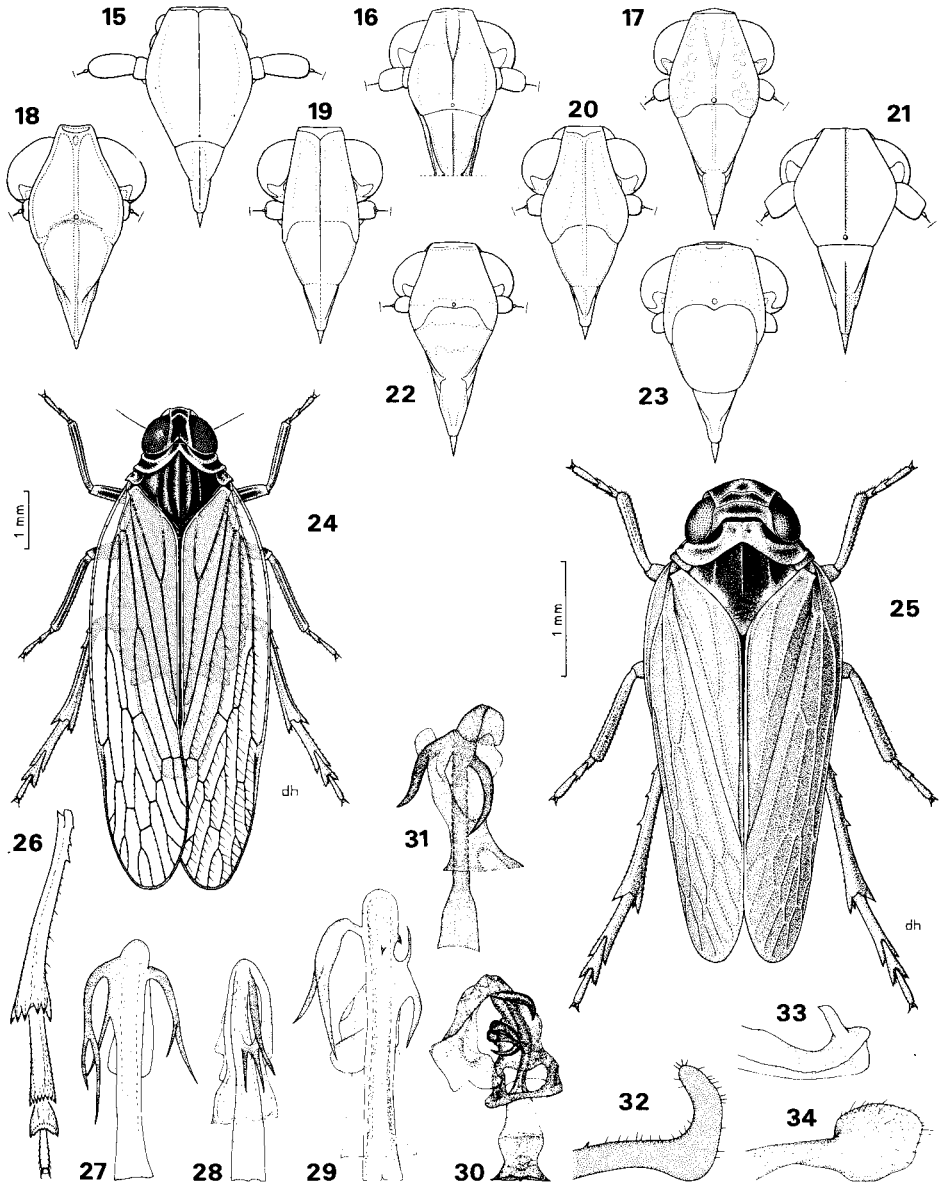
KEY TO GENERA OF DELPHACIDAE

1. Hind tibial spur awl-shaped (Fig. 47) with acute apex; frons with 2 submedian, longitudinal carinae (Fig. 35)..... *Ugyops* Guérin-Méneville
- Hind tibial spur roof-shaped (Figs 45, 46, 48) with 6 or more dark teeth on margin; frons with carinae various (Figs 36-40)..... 2
2. Frons with 2 submedian, longitudinal carinae (Fig. 36)..... *Notohyus* Fennah
- Frons with 1 median, longitudinal carina (Figs 37-40)..... 3
3. Disc of frons arch-shaped dorsally, with 12-14 pustules (Fig. 37) .. *Eorissa* Fennah
- Disc of frons not arch-shaped dorsally, without pustules (Figs 38-40)..... 4



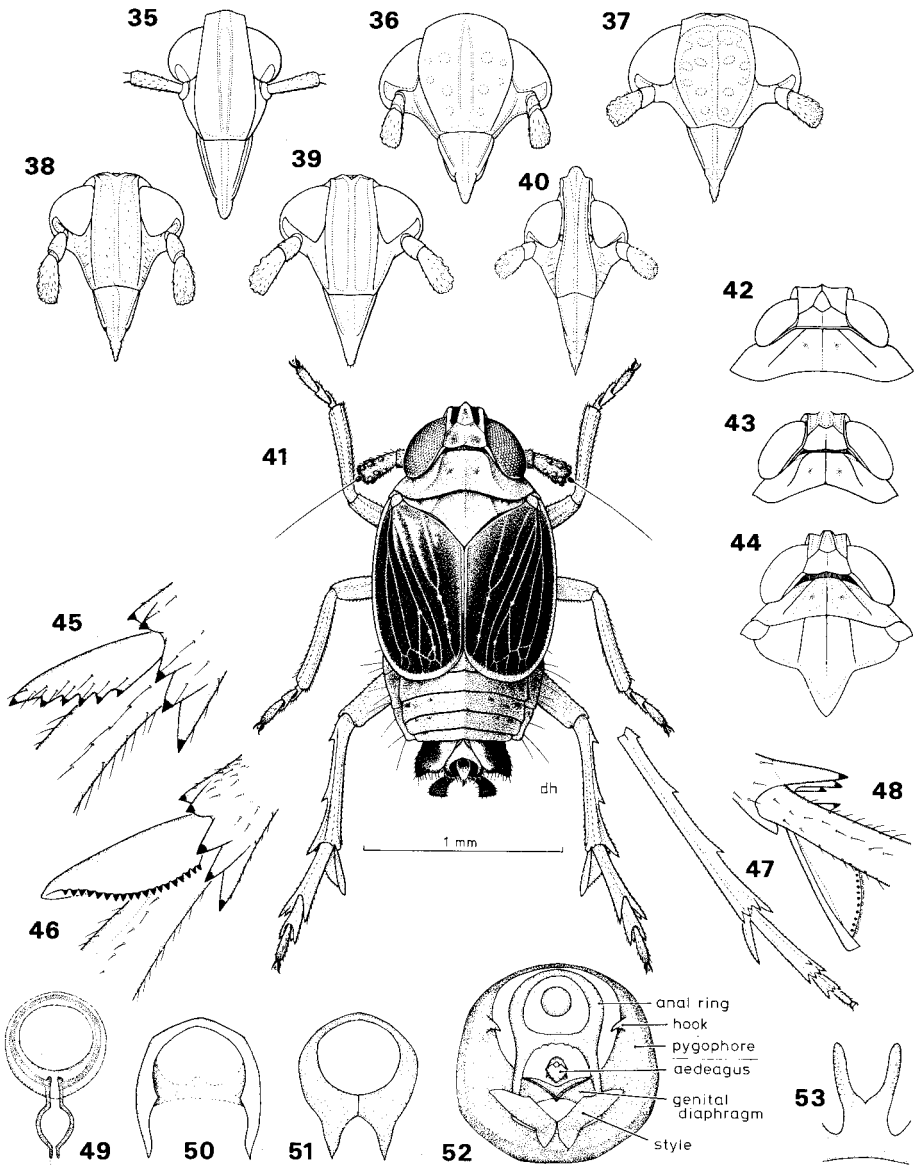
Figs 1-14.

FULGOROIDEA. 1-2, **Dictyopharidae**: *Thanatodictya lillyardi* Myers, (1) #79-82b, apex of rostrum, (2) #76-351a, entire body, dorsal aspect. 3-4, **Ricaniidae**: *Scolypopa australis* (Walker), (3) #77-328a, entire, lateral, (4) #77-328b, left hind tibia and tarsus, ventral. 5-6, **Derbidae**: *Eocenchrea maorica* (Kirkaldy), #77-12a, (5) apex of rostrum, (6) entire, lateral. 7-11, **Flatidae**: *Sephena cinerea* Kirkaldy, #77-53a, (7) head and pronotum, dorsal, (8) entire, lateral; *Siphanta acuta* (Walker), (9) #79-67b, head and pronotum, dorsal, (10) #79-67a, entire, lateral. (11) #79-37a, left hind tibia and tarsus, ventral. 12-14, **Achilidae**: *Agandecca annectens* F.B. White, lectotype, (12) entire, dorsal (mesonotum partially collapsed), (13) ♂ left style, ventrolateral aspect; (14) *Achilus flammeus* Kirby, #76-356a, entire, dorsal.



Figs 15-34.

CIXIIDAE. 15-23, Heads, anterior to anteroventral aspects: (15) *Confuga persephone* Fennah, allotype; (16) *Malpha muiri* Myers, holotype; (17) *Aka finitima* (Walker), # 78-351a; (18) *Oliarus atkinsoni* Myers, # 78-219a; (19) *Cixius ?punctimargo* Walker, # 79-81g; (20) *Koroana arthuria* Myers, # 79-81b; (21) *Tiriteana clarkei* Myers, topotype, # 79-81c; (22) *Huttia nigrifrons* Myers, # 79-81d; (23) *Semo clypeatus* F.B. White, lectotype. 24-25, Entire bodies, dorsal: (24) *Oliarus atkinsoni* Myers, # 78-219a (setae omitted on left forewing); (25) *Semo clypeatus* F.B. White, lectotype. 26, Left hind tibia and tarsus, *Oliarus atkinsoni* Myers, # 78-219a, ventral. 27-31, Aedeagi: (27) *Cixius ?kermadecensis* Myers, # 78-343e, ventral; (28) *C. ?punctimargo* Walker, # 78-343f, ventral; (29) *C. ?aspilus* Walker, # 78-343c, ventral; (30) *Koroana arthuria* Myers, # 78-342e, dorsal; (31) *Semo clypeatus* F.B. White, lectotype. 32-34 ♂ Left styles: (32) *Semo clypeatus* F.B. White, lectotype, lateroventral aspect; (33) *Malpha muiri* Myers, holotype, lateral aspect; (34) *Aka finitima* (Walker), # 78-351a, ventral aspect.



Figs 35-53.

DELPHACIDAE. 35-40, **Heads**, anterior or anteroventral aspects: (35) *Ugyops rhadamanthus* Fennah, # 79-81f; (36) *Notohyus erosus* Fennah, holotype; (37) *Eorissa cicatrifrons* Fennah, # 79-81c; (38) *Anchodelphax olenus* Fennah, # 79-81a; (39) *Sulix tasmani* (Muir), # 78-179b; (40) *Sardia rostrata phlo* (Kirkaldy), # 79-82a (Fiji, Vanua Levu, Labasa). 41, **Entire body**, *Sulix tasmani* (Muir), # 78-179a brachypterous, dorsal aspect. 42-44, **Heads and pronota**, dorsal: (42) *Notogryps melanthus* Fennah, holotype; (43) *Toya dryope* (Kirkaldy), # 79-81d; (44) *Corbulo dilpa* (Kirkaldy), # 78-352d, with mesonotum and tegulae. 45-48, **Hind tibial spurs**: (45) *Notogryps ihoma* Fennah, # 79-38a, left leg, ventral aspect; (46) *Sulix tasmani* (Muir), # 78-179a, left leg, ventral; (47) *Ugyops rhadamanthus* Fennah, # 79-81f, right hind tibia, tibial spur, and tarsus, dorsal; (48) *Nilaparvata myersi* Muir, # 79-39a, right leg, dorsal. 49-51, ♂ **Anal rings**, posterior to posterodorsal aspects: (49) *Corbulo dilpa* (Kirkaldy), # 78-352d; (50) *Nilaparvata myersi* Muir, # 79-39a; (51) *Sulix vetranio* Fennah, # 78-352f. 52, ♂ **Genitalia**, *Toya dryope* (Kirkaldy), # 78-352i, posterior aspect. 53, ♂ **Genital diaphragm**, *Anchodelphax olenus* Fennah, # 78-352h, posterior aspect.

4. Hind tibial spur with fewer than 10 teeth (Fig. 45) *Notogryps* Fennah
 – Hind tibial spur with 10 or more teeth (Figs 46, 48) 5
5. Frons apically elongate, about $3 \times$ longer than wide (Fig. 40) (Kermadec Is.)
 *Sardia* Melichar
 – Frons not apically elongate, less than $3 \times$ longer than wide (Figs 38, 39). 6
6. Male pygophore (abdominal segment IX; Fig. 52) with posterodorsal hook on each side *Toya* Distant
 – Male pygophore without posterodorsal hook on each side 7
7. Male genital diaphragm (Fig. 53) with bifurcate, dorsal process medially
 *Anchodelphax* Fennah
 – Male genital diaphragm without bifurcate, dorsal process medially 8
8. Male anal ring (abdominal segment X; Fig. 50) with semicircular apex bearing ventral spinose process on each side; hind tarsomere I with (Fig. 48) or without spines laterally *Nilaparvata* Distant
 – Male anal ring (Figs 49, 51) with circular apex bearing 2 ventral spinose processes; hind tarsomere I without spines laterally. 9
9. Male anal ring (Fig. 51) with 2 ventral processes broad and uniformly tapering to acute apex. *Sulix* Fennah
 – Male anal ring (Fig. 49) with 2 ventral processes slender and greatly elongate *Corbulo* Fennah

KEY TO GENERA OF FLATIDAE

1. Vertex very short and inconspicuous (Figs 7, 8); colour greyish tan
 *Sephena* Melichar
 – Vertex large, flat, and projecting anteriorly (Figs 9, 10); colour green or yellowish
 *Siphanta* Stål

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