

Cicadellidae and Issidae (Homoptera) of Niue Island, and material from the Cook Islands

A. C. EYLES

Entomology Division, DSIR, Lincoln, New Zealand
and

R. LINNAVUORI

Raisio, Finland

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Sixteen species of Cicadellidae (Cicadelloidea)—14 from Niue I., 6 from the Cook Is, 4 shared—and 2 species of Issidae (Fulgoroidea)—1 from Niue I., 1 from the Cook Is—are recorded. Two new species of *Empoasca* and a new subspecies of *Atylana* from Niue, new species of *Atylana* and *Calotettix* from Rarotonga, and other little-known species are described and figured. A key to the species of Cicadellidae from Niue I. is given.

INTRODUCTION

Apart from the occasional collecting of some species (mainly Lepidoptera), and the occasional pest species sent for identification, the only previous survey as such of Niue I. insects was that made in 1959 by Given (1968). Taylor (1967) recorded the ants of the Cook Is and Niue, whilst in Schedl (1972) some of the Niue and Cook material (bark and timber beetles) was included in a wider study of the Pacific Islands.

This paper deals with the Cicadelloidea, and the Issidae only of the Fulgoroidea. The material from Niue I. was collected by one of us (A.C.E.), at the request of the Niue Department of Agriculture, over a four-week period in September and early October 1964 (except where other data are given). During April 1965, Dr G. W. Ramsay of Entomology Division, DSIR, as a member of the scientific expedition to observe the solar eclipse from Manuae Atoll, collected what material he could during the half- to three-day periods ashore on some of the southern Cook Is. Material taken by him during stops at the Society Is and Fiji has also been included. Previously collected material from the Cook Is (the C. E. Clarke collection, deposited in the Auckland Institute and Museum) is also included. Between 27 August and 29 September 1969, Mr K. A. J. Wise of the Auckland Institute and Museum, as a member of the Cook Bicentenary Expedition, collected insects during 10 days at Aitutaki, 2 weeks on Rarotonga, and a few hours on Atiu and Mangaia (Wise 1971).

All except one of the species from Niue recorded here are new records for the island. Also, five of the six species noted from the Cook Islands are new records; all are from islands of the southern group—no full survey of the Cook Islands has yet been undertaken. Little or nothing is known of the biology of most species and, unless indicated, economic

importance is unknown. The material is deposited in collections held by Entomology Division (DSIR), R. Linnavuori, and Auckland Institute and Museum, with a reference collection at the Niue Department of Agriculture.

SYSTEMATICS

Hemiptera have the mouthparts modified into a tube for piercing and sucking, and have the forewings of harder consistency than the hind wings. Homoptera are distinguished from most Heteroptera by the uniform consistency of the forewings, which are not differentiated into corium and membrane. The Fulgoroidea are distinguished from most Cicadelloidea and the Cercopoidea by having a Y-vein on the clavus of the forewings, the stalk of the Y located distally and the arms nearest the wing base. The Cicadelloidea are distinguished from the Cercopoidea by the hind tibiae, which are flattened and bear usually rows of numerous spines; in the Cercopoidea these are cylindrical and bear one or two strong spines (Woodward *et al.* 1970).

CICADELLIDAE

KEY TO NIUE I. CICADELLIDAE

- 1. Anterior margin of head continuous in dorsal aspect, eyes and vertex at the same level (Fig. 1a).....2
 Anterior margin of head not continuous in dorsal aspect, 'stepped' between eyes and vertex (Fig. 1b) (Coelidiinae)..... *Tharra testacea*
- 2. Tegmen with reduced venation (Typhlocybinae).....3
 Tegmen with venation complete.....5
- 3. Half of eye extending posteriorly beyond anterior margin of pronotum (at middle); length of crown less than length of pronotum (*Empoasca*).....4
 Much less than half (about 1/3) of eye extending posteriorly beyond anterior margin of pronotum (at middle); length of crown greater than length of pronotum..... *Dayus euryphaessa*
- 4. Anterior margin of head with a black-brown pattern (Fig. 4a-c)..... *Empoasca clodia* n.sp.
 Anterior margin of head pale..... *Empoasca niuensis* n.sp.
- 5. Frontal sutures ending at antennal pits (Fig. 1c); crown and pronotum striated (usually green species)6
 Frontal sutures distinctly continuing past antennae, ending at or near ocelli (Fig. 1d); crown and pronotum not striated.....7
- 6. Body broad; antennal ledges well developed; crown very short, of more-or-less uniform length, and transversely striated (Iassininae)..... *Batracomorphus angustatus*
 Body narrow; antennal ledges moderately developed; crown distinctly longer medially than laterally, longitudinally striated (Paraboloponinae)..... (Cook Is only) *Calotettix lais* n.sp.
- 7. Submarginal vein of flying wings evanescent apically; frons expanded laterally over base of antenna, forming a relatively deep, though inconspicuous, antennal pit (Xestocephalinae)..... *Xestocephalus purpurascens*
 Submarginal vein of flying wings present apically; antennal pits shallow; antennal ledges indistinct (Deltoccephalinae)8
- 8. Ocelli distinctly dorsal..... *Exitianus plebeius*
 Ocelli not dorsal, but on anterior curvature between dorsal and ventral aspects.....9
- 9. Anterior outline of head pointed (Fig. 1e) and/or each tegmen with three oval, pale spots following claval commissure (*Orosius*).....10

- Anterior outline of head a rounded curve (Fig. 1a); each tegmen lacking three oval, pale spots following claval commissure11
10. Anterior outline of head pointed; robust species *Orosius lotophagorum*
Anterior outline of head not pointed; slender, more delicate species *Orosius argentatus*
11. Body narrow; tegmen mostly pale; delicate insects (*Balclutha*)12
Body not narrow; distinct dark markings over most of tegmen; robust insects *Satsumanus ornatellus*
12. Length 2.5 mm or less; post-clypeus with distinct brown pattern *Balclutha saltuella*
Length 3 mm or more; post-clypeus without brown pattern13
13. Pronotum with five longitudinal, narrow, light brown, orange, or yellow stripes *Balclutha frontalis*
Pronotum without longitudinal stripes14
14. Flagellum of antenna distinctly shorter than width of head (14:17) (♂) *Balclutha incisa*
Flagellum of antenna at least approx. equal to, or longer than, width of head (15.0 : 14.5) (♂)
..... *Balclutha lucida*

DELTOCEPHALINAE

OPSIINI

***Orosius argentatus* (Evans)**

Thamnotettix argentata Evans, 1938, Pap. Proc. R. Soc. Tasm. 1937: 15.

Length 2.9–3.3 mm, width 1.0–1.15 mm. Distinguished from *O. lotophagorum* by the rounded rather than pointed anterior outline of the head, and by the slender, more delicate form.

DISTRIBUTION. Australia, Norfolk I., Fiji, Niue I., Micronesia, Danger I., New Britain I., Java, and probably Malaysia and the Philippines (*see also* Ghauri 1966, Oman 1949).

ECONOMIC IMPORTANCE. A vector of virus diseases on tomato, tobacco, and lucerne (Heinze 1951).

MATERIAL EXAMINED. Niue Island: Amanau – 1 ♂, 1 ♀, sweeping low vegetation including weeds; Hakupu and near – 1 ♂, sweeping young kumara crops, 4 ♂♂, 3 ♀♀, sweeping weeds on arable land, 2 ♂♂, sweeping young coconut palms 60 cm high; Toi – 1 ♀, sweeping weeds under bananas.

***Orosius lotophagorum* (Kirkaldy) (Fig. 1e)**

[*Dryadomorpha*] *lotophagorum* Kirkaldy, 1907, Bull. Div. Ent. Hawaiian Sug. Plrs' Ass. Exp. Stn 3: 41.

Length 3.0–3.5 mm, width 1.0–1.25 mm. Distinguished from *O. argentatus* by the pointed anterior outline of the head, and by the more robust form.

DISTRIBUTION. Fiji, Niue I., Micronesia.

ECONOMIC IMPORTANCE. This species, including young stages, was abundant on kumara (sweet potato) crops, whereas *O. argentatus* was taken mostly on weeds. Other hosts for *O. lotophagorum* are *Boerhavia diffusa*, *Portulaca*, *Sesuvium*, *Sida* (Linnavuori 1960).

MATERIAL EXAMINED. Niue Island: Avatele – 1 ♀, sweeping mature kumara crop; Fanuakula – 3 ♂♂, 3 ♀♀, sweeping old kumara crop; Fuata – 1 ♂, 3 ♀♀, sweeping thickly leaved growing kumara crop; Hakupu – 1 ♂, 1 ♀, sweeping young kumara crop; Mutalau – 1 ♂, sweeping grass; Paliati – 1 ♂, 2 ♀♀, sweeping kumara crop.

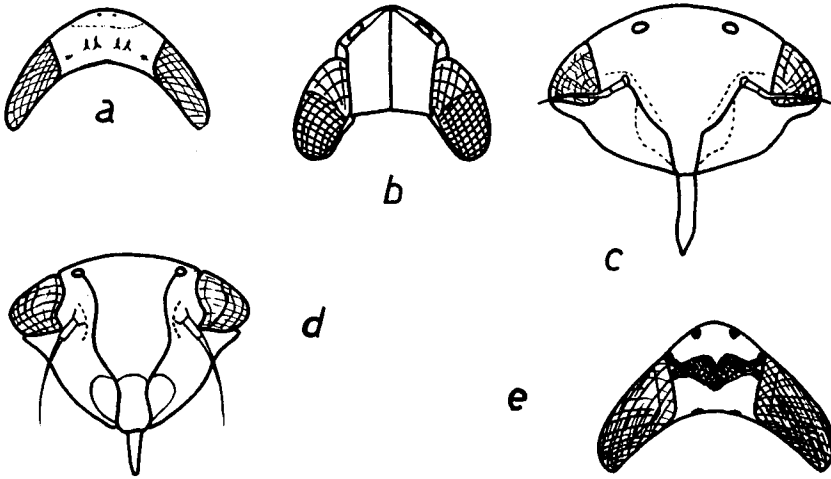


FIG. 1—Heads of: (a) *Satsumanus ornatellus*, dorsal view; (b) *Tharra testacea*, dorsal view; (c) *Batracomorphus angustatus*, ventral view; (d) *Balclutha incisa*, antero-ventral view; (e) *Orosius lotophagorum*, dorsal view.

***Satsumanus ornatellus* (Osborn) (Figs 1a; 5a,b)**

Eutettix ornatella Osborn, 1934, Insects of Samoa Part II: 178.

Length 3.3–3.75 mm (♂), 4.0–4.2 mm (♀); width 1.0–1.25 mm (♂), 1.3–1.5 mm (♀). Speckled with fuscous spots, and with a conspicuous, long, white spot on the costal side of the tegmen. Penis as in Fig. 8a,b.

DISTRIBUTION. Western Samoa, Niue I., the Cook Is. This is the first record of *S. ornatellus* outside Western Samoa.

MATERIAL EXAMINED. Niue Island: Alofi – Lakepu – 3 ♂♂, 2 ♀♀, sweeping convolvulus and bushes on roadside; Avatele – 1 ♂, sweeping red-leaved hedge; Halagigie Point – 3 ♀♀, in light trap. Cook Islands (southern group): Rarotonga – Mt. Maungatea, 1 ♂, 10.x.1937, C. E. Clarke collection.

STIRELLINI

***Exitianus plebeius* (Kirkaldy)**

[*Neophotettix*] *plebeius* Kirkaldy, 1906, Bull. Div. Ent. Hawaiian Sug. Plrs' Ass. Exp. Stn 1: 331.

Length 4.3–4.5 mm (♂), 5.0–5.2 mm (♀); width 1.5–1.6 mm (♂), 1.6–1.8 mm (♀). Distinguished by the black line across the vertex behind the ocelli (which are situated dorsally). Tegmen more or less transparent, with veins brown and showing as longitudinal lines. Breeding on pasture.

DISTRIBUTION. Australia, the Cook Is, Fiji, Tonga (north and south), Niue I., Western Samoa, American Samoa, the Society Is.

MATERIAL EXAMINED. Niue Island: Amanau – 4 ♂♂, 4 ♀♀, sweeping low vegetation including weeds; Hakupu – 2 ♂♂, sweeping weeds on arable land; Lefuka – 1 ♂, sweeping roadside vegetation; Vaiea – 8 ♂♂, 6 ♀♀, nymphs (all stages), sweeping pasture; Vaipapahi – 4 ♂♂, 5 ♀♀, sweeping Batiki blue grass plot; 1 ♂.

sweeping Guatemala grass plot. **Cook Islands** (southern group): Aitutaki – Maina I., 1 ♂, 1 ♀, 3.ix.1969 (K. A. J. Wise); Maungapu, sweeping by road, 1 ♂ (approx. 61–91 m), 1 ♀ (approx. 2–30 m), 2.ix.1969 (K.A.J.W.); Outu, 1 ♂, 16.v.1965 (G. W. Ramsay); Manuae – Te Aoutu, 1 ♂, 14.v.1965 (G.W.R.); Rarotonga – 1 ♀, 22.viii.1937 (C. E. Clarke collection); Muri, 1 ♂, 1 ♀, 29.xii.1937 (C.E.C. coll.); Oneroa I., 4 ♂♂, 5 ♀♀, 12.ix.1969 (K.A.J.W.). **Society Islands**: Tahiti – Faone, 1 ♀, 23.v.1965 (G.W.R.).

MACROSTELINI

Balclutha frontalis (Ferrari)

G[nathodus] frontalis Ferrari, 1882, Annali Mus. civ. Stor. nat. Giacomo Doria 18: 117.

Length 3.2–5.0 mm, width 0.95–1.1 mm. Distinguished by the five narrow, longitudinal, light brown, orange, or yellow stripes on the pronotum.

DISTRIBUTION. Described from Italy, this species is cosmopolitan in the tropical and warm temperate regions. It is here recorded from Niue I. and the Cook Islands for the first time.

MATERIAL EXAMINED. **Niue Island:** Alofi – 1 ♂, sweeping coastal bush; Hakupu – 1 ♂, sweeping weeds on arable land; Halagigie Point – 1 ♀, light trap; Paliati – 2 ♂♂, sweeping kumara crop; Vaiea – 2 ♂♂, 3 ♀♀, sweeping pasture, 1 ♀, sweeping elephant grass plot; Vaipapahi – 1 ♂, sweeping Batiki blue grass plot, 1 ♂, sweeping Guatemala grass plot. **Cook Islands** (southern group): Aitutaki – 1 ♂, 15.v.1965 (G. W. Ramsay); Amuri, 1 ♀, sweeping, 28.viii.1969 (K. A. J. Wise); Maungapu, 18 ♂♂, 18 ♀♀, on ridge, approx. 91 m, 28.viii.1969, 1 ♂, 1 ♀, sweeping by road, approx. 2–30 m, 2.ix.1969; 6 ♂♂, 12 ♀♀, grass zone near summit, approx. 91–118 m, 3.ix.1969 (K.A.J.W.); Rarotonga – 1 ♀, 8.v.1965 (G.W.R.); Anatiu, 2 ♀♀, 9.v.1965 (G.W.R.). **Fiji:** Colaisura Stream – 1 ♂, 1 ♀, 13–18.vi.1965 (G.W.R.).

Balclutha incisa (Matsumura) (Fig. 1d)

Gnathodus incisus Matsumura, 1902, Természettud. Fü. 25: 360.

Length 3.2–3.6 mm, width 0.9–1.1 mm.

DISTRIBUTION. Japan, the Philippines, the Hawaiian Is, Micronesia, Fiji, Western Samoa, American Samoa, Niue I., the Cook Is, the Marquesas Is, Australia, the Americas, the West Indies, the Canary Is, Cyprus, Iraq.

ECONOMIC IMPORTANCE. Taken on Bermuda grass, *Cynodon dactylon*, (Ballou 1936). Food plants are sugar cane; the grasses *Eriochloa subglabra*, *Panicum barbinode*, and Bermuda grass; sedge (*Cyperus ferox*); sweet potato; and carrots (Wolcott 1923a)—some of these food plants are available on Niue. This species is preyed upon by lizards (Wolcott 1923b).

MATERIAL EXAMINED. **Niue Island:** Hakupu – 3 ♂♂, 6 ♀♀, sweeping weeds on arable land. **Cook Islands** (southern group): Atiu – 1 ♂, 24.ix.1969 (G. F. Preddey).

Balclutha lucida (Butler)

Jassus lucidus Butler, 1877, Proc. zool. Soc. Lond.: 91.

Length 3.25 mm, width 0.95 mm (♂ only).

DISTRIBUTION. Chile (incl. James I.), Galapagos Is, Central America, Mexico, Texas and Florida (S. United States), the West Indies, the Marquesas Is, Niue I., Micronesia.

MATERIAL EXAMINED. **Niue Island:** Toi – 1 ♂, sweeping weeds under bananas.

Balclutha saltuella (Kirschbaum)

[*Jassus*] (*Th[amnotettix]*) *saltuellus* Kirschbaum, 1868, Jb. nassau. Ver. Naturk. 21–22: 86.

Length 2.20–2.45 mm, width 0.6–0.7 mm. Similar to *B. frontalis*, but distinguished by the smaller size and by the distinct brown pattern on the post-clypeus.

DISTRIBUTION. Cosmopolitan.

MATERIAL EXAMINED. Niue Island: Amanau – 2 ♂♂, 1 ♀, sweeping low vegetation including weeds.

XESTOCEPHALINAE

Xestocephalus purpurascens Kirkaldy

[*Xestocephalus*] *purpurascens* Kirkaldy, 1907, Bull. Div. Ent. Hawaiian Sug. Plrs' Ass. Exp. Stn 3: 52.

Length 3.0 mm, width 1.2 mm (♂ only). Tegmen with widely spaced, regular, brown markings, some of which appear to be borders enclosing or almost enclosing pale 'cells'. Vertex with a narrow, transverse, brown band anteriorly, between the eyes.

DISTRIBUTION. Australia, Fiji, Niue I.

MATERIAL EXAMINED. Niue Island: Alofi – 1 ♂, sweeping forest.

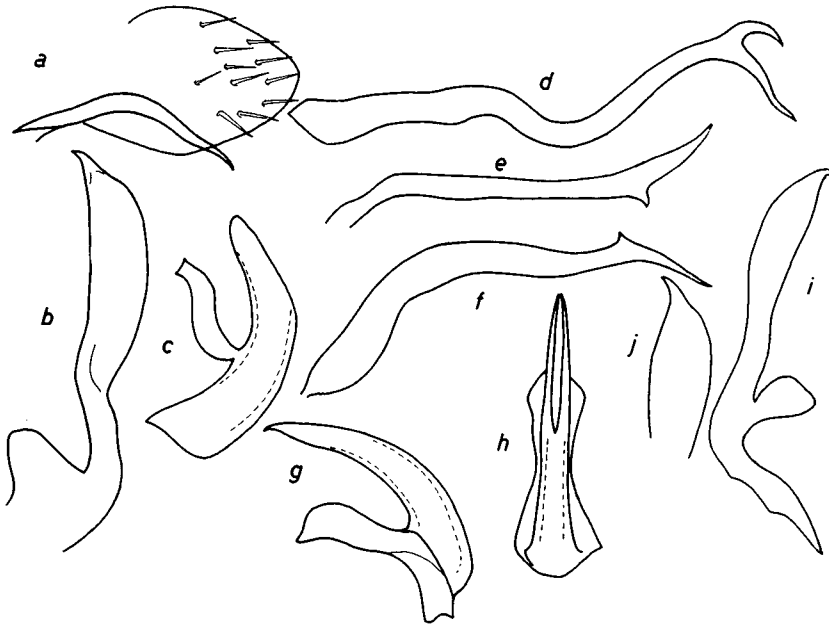


FIG. 2.—*Batracomorphus angustatus* (holotype): (a) side lobe of pygophore, lateral aspect; (b) stylus; (c) penis, lateral aspect. *B. tutuilanus* (paratype): (d) appendage of pygophore (other genitalia as in *B. punctatus*). *B. montaguei* (♂ from New Ireland, Namatandi, *B. montaguei* det. China): (e) appendage of pygophore (other genitalia as in *B. punctatus*). *B. punctatus* (holotype): (f) appendage of pygophore (side lobe as in 2a); (g) penis from side; (h) same, ventral aspect; (i) stylus; (j) apex of same.

COELIDIINAE

Tharra tahitiensis (Osborn)

DISTRIBUTION. The Society Is, the Cook Is (southern group).

MATERIAL EXAMINED. Cook Islands (southern group): Atiu – 1 ♂, 28–29.v.1965 (G. W. Ramsay). In addition, probably of this species: Rarotonga – Avatiu, 1 ♀, 29.xi.1937 (C. E. Clarke); near *tahitiensis*: Rarotonga – Maungatea area, 1 ♀, 23.vii.1937, 1 ♀, 16.x.1937; Needle, 5 ♀♀, 17.x.1937; locality unspecified, 1 ♀, 7.xi.1937, 1 ♀, 17.xi.1937 (all C. E. Clarke collection).

Tharra testacea (Walker)

(Fig. 1b)

MATERIAL EXAMINED. Niue Island: locality unspecified – 1 ♀, —.ii–iii.1959, B. B. Given; Alofi area – 2 ♂♂, 2 ♀♀, sweeping forest, 1 ♂, sweeping bracken fern and low bushes; Alofi-Lakepa – 1 ♀, sweeping taro crop 1 nymph, sweeping coconut; Alofi-Liku – 1 nymph, sweeping forest and shrubs; Amanau – 1 ♂, sweeping shrubs and trees, 1 nymph, sweeping low vegetation including weeds; Hakupu – 1 ♂, 3 ♀♀, 1 nymph, sweeping shrubs and trees, 1 nymph, sweeping weeds under bananas.

Batracomorphus angustatus (Osborn) (Figs 1c, 2a–c)

Bythoscopus angustatus Osborn, 1934, Insects of Samoa Part II: 166.

Length 4.6 mm (♂), 5.1 mm (♀); width 1.6 mm (♂), 1.85–2.1 mm (♀). Robust; head broad, with crown very short. Closely related to *B. hamadryas* (Kirkaldy), redescribed in Linnavuori (1960, p. 9) from Fiji, but body narrower, penis (Fig. 2c) shorter, and appendages of pygophore (Fig. 2a) slender. For comparison, male genitalia of some other little-known *Batracomorphus* species from Oceania are illustrated in Fig. 2d–j.

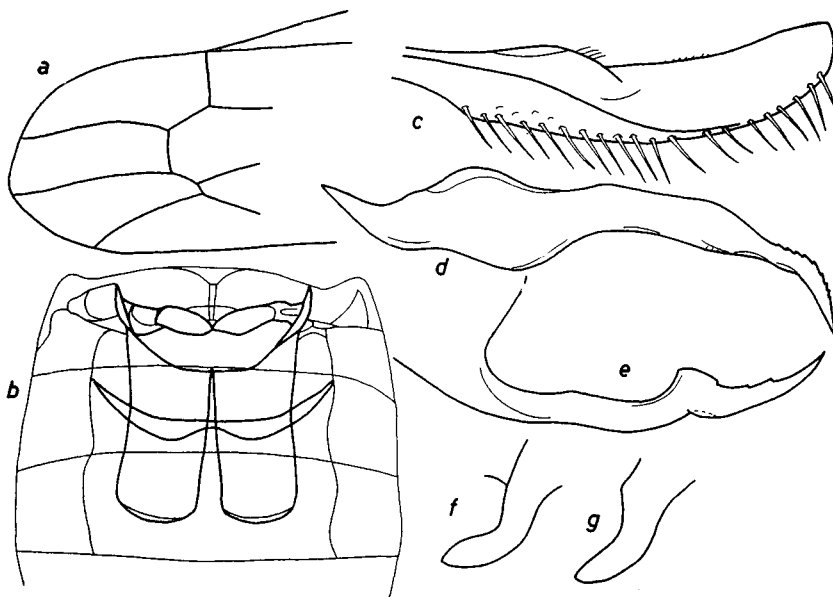


FIG. 3—*Empoasca niuensis* n.sp.: (a) apex of elytron; (b) abdominal apodemes; (c) genital plate; (d) stylus; (e) appendage of pygophore; (f,g) appendages of anal tube.

DISTRIBUTION. North Tonga, American Samoa, Niue I. Associated with taro, kumara, and weeds; two nymphs were taken on *Crotalaria*.

MATERIAL EXAMINED. Niue Island: Amanau – 2 ♀♀, sweeping low vegetation including weeds; Hikatu-vake – 1 ♀, sweeping spindly-looking weed on roadside; Mutalau – Fulala, 1 ♂, 1 ♀, sweeping disced taro crop; Paliati – 1 ♂, sweeping kumara crop; Talava Arches – 1 ♀, on coastal shrubs; Toi – 1 ♀, sweeping weeds under bananas.

TYPHLOCYBINAЕ

Dayus euryphaessa (Kirkaldy)

Cicadula euryphaessa Kirkaldy, 1907, Bull. Div. Ent. Hawaiian Sug. Plrs' Ass. Exp. Stn 3: 46, 68.

Length 2.2 mm, width 0.55 mm (♂ only). Distinguished by its small size and almost completely red colour.

DISTRIBUTION. Fiji, Niue I. Taken on *Saccharum officinarum* (Kirkaldy 1907).

MATERIAL EXAMINED. Niue Island: Alofi – 1 ♂, sweeping forest.

Empoasca niuensis n.sp. (Fig. 3)

Length 2.75 mm (♂), 3 mm (♀). Greenish yellow; tegmina greenish hyaline, apex slightly smoky. Gracile, resembling other related species such as *E. tavuaensis* Linnavuori (Fiji) in general habit. Crown of nearly uniform length, or slightly produced medially. Third apical cell of tegmina (Fig. 3a) not stalked. Abdominal apodemes (Fig. 3b) long and broad, parallel. Male genitalia as in Fig. 3c–g. Genital plates longish, parallel-sided. Side lobes

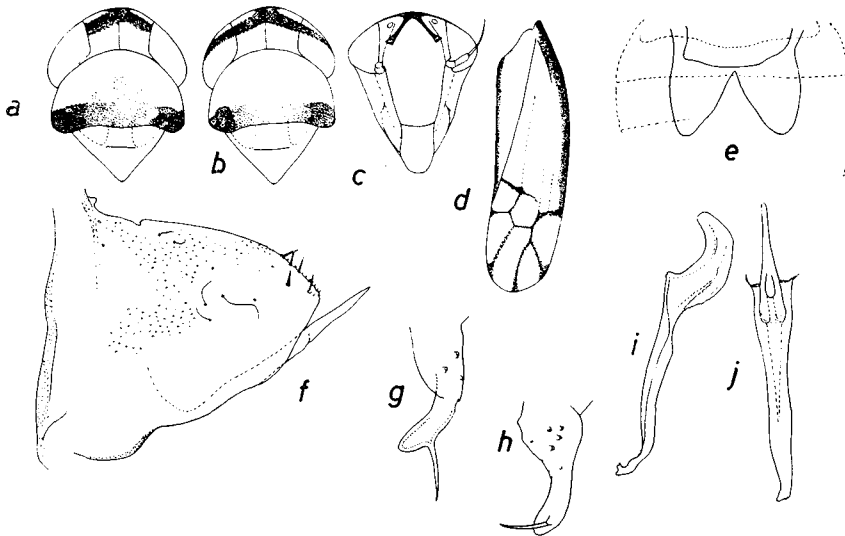


FIG. 4—*Empoasca clodia* n.sp.: (a) head, pronotum and scutellum (♂); (b) same (♀); (c) face (♂); (d) elytron (♀); (e) abdominal apodemes; (f) side lobe of pygophore, lateral aspect; (g,h) appendages of anal tube; (i) penis, lateral aspect; (j) same, ventral aspect (Drawn by Dr I. Dworakowksa).

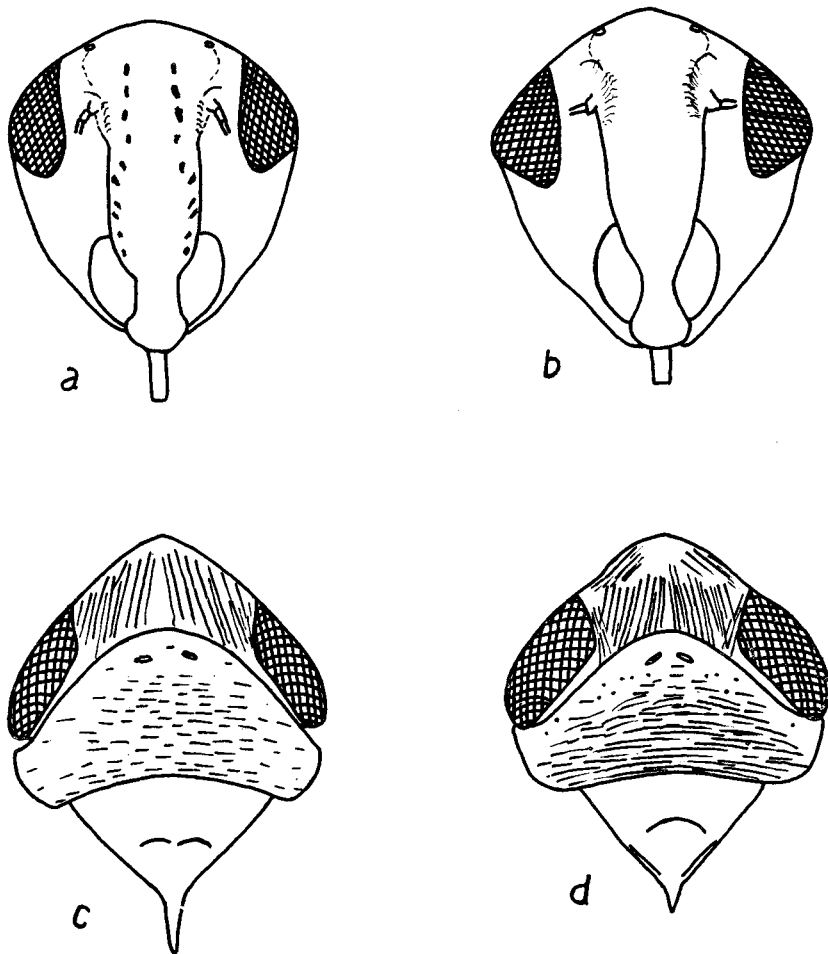


FIG. 5—*Calotettix* spp.: (a) face of *C. lais* n.sp. (allotype ♀); (b) face of *C. metrosideri* (holotype ♀); (c) dorsal view of head, pronotum and scutellum of *C. lais* n.sp. (allotype ♀); (d) same of *C. metrosideri* (holotype ♀).

of pygophore triangular, appendages in ventral margin extending near to apex of pygophore. Processes in basal ventral angles of anal tube digitate, recurved basad. Penis simple, reduced.

Niue Island: HOLOTYPE: Fusimataunga – ♂, sweeping shrubs and trees, 17.ix.1964 (A. C. Eyles; Entomology Division collection). PARATYPE: Hikatuvahe – ♂, sweeping shrubs and trees. Moreover, 10 ♀♀ from Niue apparently belong to the species: Alofi – sweeping forest and breadfruit; Amanau – sweeping low vegetation, including weeds; Fuata – sweeping kumara crop; Hakupu – sweeping young kumara crop; Vaipapahi – on mandarin orange trees.

REMARKS. Very near *E. tavuaensis* from Fiji (Linnavuori 1960, pp. 14–15), but abdominal apodemes broader, appendages of pygophore longer and more gracile, and processes of anal tube different shape.

Empoasca clodia n.sp. (Fig. 4)

Length 3.15 mm (♂), 3.50 mm (♀). Yellow. Anterior margin of head with a black-brown pattern as in Fig. 4a–c, ocelli surrounded by ivory colour. Basal margin of pronotum with a wide, transverse, dark band, darkest at sides. Basal $\frac{2}{3}$ of tegmina (Fig. 4d) yellowish, costal margin and scutellar and commissural margins of clavus dark brown; apical $\frac{1}{3}$ hyaline, slightly smoky or nearly colourless, veins dark brown, obliquely transverse dark band from tip of clavus to costal margin very narrow and broken. Resembling *E. vitiensis* (Kirkaldy), but somewhat more robust. Abdominal apodemes (Fig. 4e) diverging caudad, distinctly narrowing apicad. Appendages of pygophore (Fig. 4f) comparatively thick, not sharp-tipped. Genital plates as in *E. vitiensis*, but not sclerified apically. Penis simple, as in Fig. 4i–j. Processes of anal tube (Fig. 4g–h) with a thin, spur-like appendage (present also in *E. vitiensis*, although omitted in fig. 4 in Linnavuori 1960, p. 15).

Niue Island: HOLOTYPE: Toi – ♂, sweeping weeds under bananas, 15.ix.1964 (A. C. Eyles; Entomology Division collection). PARATYPES: Fanuakula – 1 ♀, sweeping old kumara crop; Vaiea – 1 ♀, sweeping elephant grass plot, 1 ♀, beating kaheme tree.

REMARKS. In *E. vitiensis* the anterior margin of the head is whitish, bordered by a transverse, black band both above and below. The basal margin of the pronotum has a slight orange tinge, but is never blackish. The costal and inner margins of the clavus of the tegmen are not darkened. The abdominal apodemes are close to each other, only slightly tapering apicad, and broadly rounded apically. The genital plates are distinctly sclerified apically.

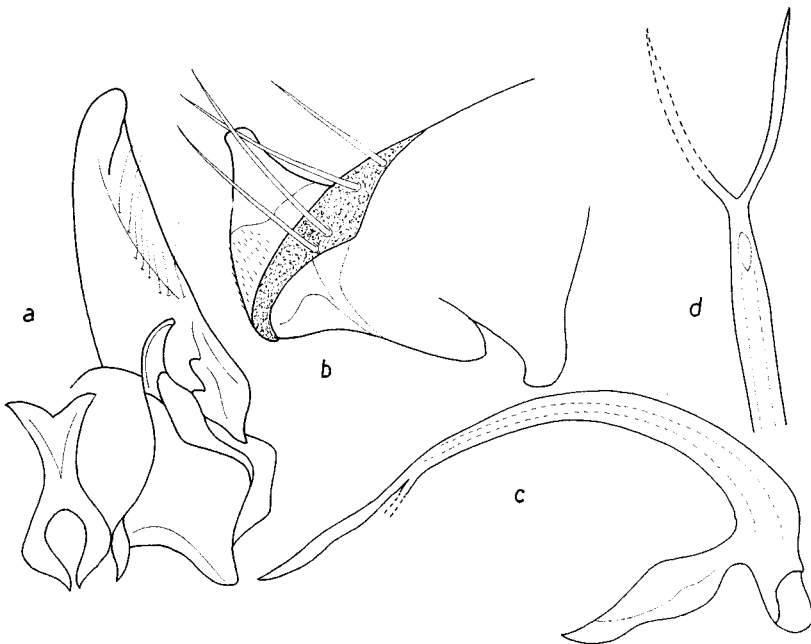


FIG. 6—*Calotettix lais* n.sp.: (a) genital plate, stylus, and connective; (b) side lobe of pygophore; (c) penis, lateral aspect; (d) apex of same, ventral aspect.

PARABOLOPONINAE

Genus *Calotettix* Osborn (Figs 5-7)

Calotettix] Osborn, 1934, Bull. Bernice P. Bishop Mus. 114: 247-8.

TYPE SPECIES. *C. metrosideri* Osborn, from the Marquesas Is.

Largish green species with the common characters of the subfamily. Head slightly broader than pronotum, rounded or bluntly angular, anterior margin acute. Face rather elongate, bluntly triangular in outline below eyes, flattish; anteclypeus strongly expanded apically; frontoclypeus narrow, nearly parallel-sided below level of antennal pits; lora large; ocellocular area broad; antennal pits deep, near upper margin of head; antennae very long. Crown distinctly shorter than median length of pronotum, with distinct longitudinal striations. Pronotum convex, with strong, dense, transverse wrinkles, obsoletely punctate, lateral margins very short. Tegmen hyaline, elongate, distinctly longer than abdomen, with two long, closed, subapical cells, and no extra cross veins. Spinulation of dorsal surface of fore tibiae 1+4 or 1+5, of apices of hind femora 2+1+1. Pygophore short, broadly conical, roundly incised behind anal tube; side lobes truncately expanded apically, provided with a sclerified process and a few long macrosetae. Anal tube broadly conical, largish, extending to near apex of pygophore, sclerified. Genital plates much longer than pygophore, elongately triangular, with long hairs on dorsal surface, without macrosetae. Apophysis of stylus short, digitate, basal part of stylus broad, squarish. Connective short, Y-shaped, with arms converging apically. Penis

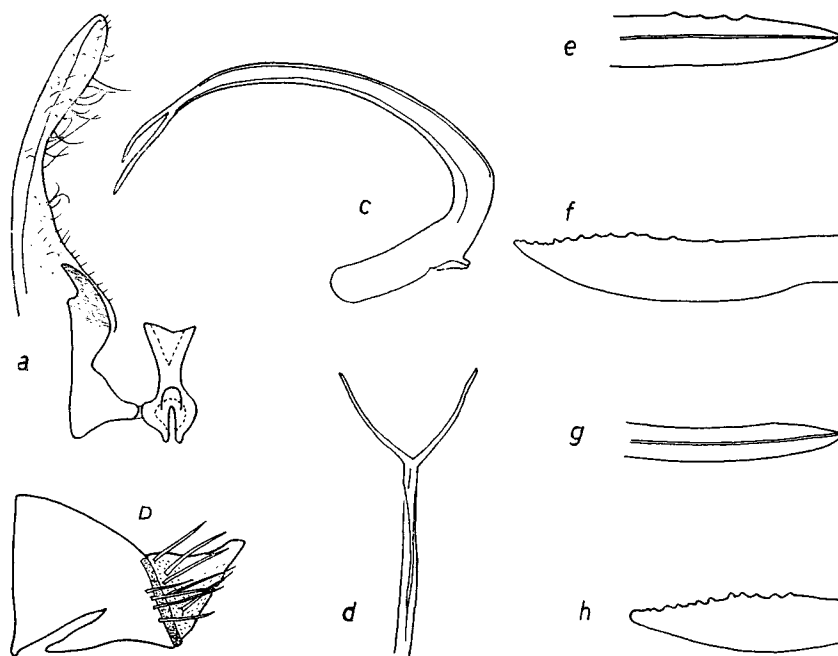


FIG. 7.—*Calotettix* spp. *C. metrosideri* (allotype ♂): (a) genital plate, stylus, and connective; (b) side lobe of pygophore; (c) penis, lateral aspect; (d) apex of same, ventral aspect. *C. lais* n.sp. (paratype ♀): (e) tip of 1st valvula; (f) tip of 2nd valvula. *C. metrosideri* (paratype ♀): (g) tip of 1st valvula; (h) tip of 2nd valvula.

symmetrical, stem long and gracile, provided with a pair of long, falcate, apical appendages; gonopore subapical on ventral surface. Hind margin of 7th sternite (♀) subtruncate.

DISTRIBUTION. Previously known only from the Marquesas Is.

BIOLOGY. The type species is found on *Metrosideros collina* and *Weinmannia* sp.

REMARKS. Very closely related to *Oceanopona* Linnavuori (Micronesia), but differing in the large size, the more elongate face, the narrow frontoclypeus, the strong microsculpturing of the head and pronotum, the convex pronotum, the spinulation of the apices of the hind femora, the large sclerified anal tube, and the sclerified pygophoral processes.

***Calotettix lais* n.sp.** (Figs 5a,c; 6; 7e,f)

Length 5.25 mm (♂), 6.75 mm (♀). Yellowish green. Eyes brown; frontoclypeus with distinct dark markings (Fig. 5a). Base of pronotum with slight orange tinge. Tegmen greenish hyaline, veins gracile, brown; commissural margin of clavus narrowly embrowned. Dorsum of abdomen largely darkened. Dorsum and venter of fore and middle femora with minute dark dots. All tibiae with distinct black spots. Anterior outline of head (Fig. 5c) pointed and not sinuate before eyes; crown in ♂ only a little longer medially than laterally, $0.6\times$ as long as median length of pronotum; in ♀ bluntly angulate, about $0.7\times$ as long as pronotum. Scutellum with long, narrow, pointed apex (Fig. 5c), at least in ♀♀. Male genitalia as in Fig. 6. Seventh sternite in ♀ as long as 6th, hind margin subtruncate, with

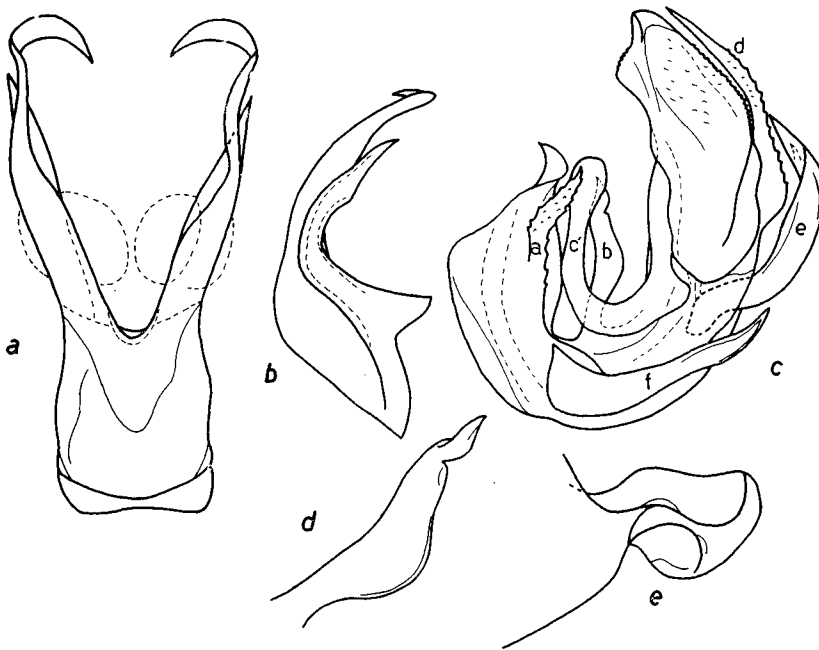


FIG. 8—*Satumanus ornatellus*: (a) penis, ventral aspect; (b) same, lateral aspect. *Atylana maculifrons ochracea* n.ssp.: (c) penis, lateral aspect; (d) appendix b of same; (e) apex of stylus.

two small, dark spots at middle. Female genitalia with tip of 1st valvula (Fig. 7e) as well as that of 2nd valvula (Fig. 7f) serrated.

Cook Islands (southern group): HOLOTYPE: Rarotonga – ♂, 15.xii.1937 (C. E. Clarke collection, Auckland Institute and Museum). ALLOTYPE ♀: same data except 14.x.1937. PARATYPES: 3 ♀♀, same data except different dates (in Auckland Institute and Museum, and R. Linnavuori collections).

REMARKS. *C. lais* n.sp. is distinguished from *C. metrosideri* Osborn by the absence of the black spot on the tegmen, the wider apex of the frontoclypeus, the distinct dark markings on the frontoclypeus (Fig. 5a), the anterior outline of the head (Fig. 5c), and the distinctly longer, pointed apex of the scutellum (Fig. 5c) (at least in ♀♀). The ♂ genitalia are similar (Figs 6, 7a–d), except perhaps for the macrosetae on the side lobe of the pygophore (Fig. 6b). However, in the ♀ genitalia the 1st valvula is serrated at the tip (Fig. 7e), while in *metrosideri* it is smooth (Fig. 7g). For comparison, the face of *C. metrosideri* is shown in Fig. 5b, the head, pronotum, and scutellum in Fig. 5d, the ♂ genitalia in Fig. 7a–d, and the tip of the 1st and 2nd valvulae of the ♀ in Fig. 7g–h. *C. metrosideri* is 5–6 mm long, has a black, triangular spot at the base of the inner apical cell of the tegmen, and the 7th sternite in the ♀ appears longer. The holotype ♀, allotype ♂, 2 ♀ paratypes, and 2 ♀♀ of *C. metrosideri* (Hivaoa) were examined.

ISSIDAE

Atylana maculifrons (Muir) ssp. *ochracea* n.ssp. (Fig. 8c–e)

Length 5.5 mm (♂), 6.25–7 mm (♀). Yellow-brown. Frons with distinct fuscous irroration, especially in the median compartment. Also clypeus and femora lightly or darkly infumed, femora at least in part. Crown 2.0–2.1 × as broad basally as long medially. Frons broadening downwards, about 1.32–1.37 × as long medially as broad (greatest width), lateral keels distinct, median ridge faintly visible in ♀, evanescent in ♂. Hind tibiae with two lateral spines. Penis as in Fig. 8c,d. Apex of stylus as in Fig. 8e.

Niue Island: HOLOTYPE: Hakupu – ♂, sweeping shrubs and trees, 15.xi.1964 (A. C. Eyles; Entomology Division collection). PARATYPES: 1 ♀, same data as holotype; Alofi to Lakepa – 1 ♀, sweeping convolvulus and bushes on roadside; Alofi to Liku – 1 ♀, sweeping forest; Hakupu – 1 ♂, sweeping weeds around bananas; Tamakautoga – 1 ♀, sweeping roadside vegetation. Immature stages were also taken.

REMARKS. Differing from the nominate form, recently redescribed by Fennah (1967, pp. 63–4), in the uniformly pale ochraceous, transparent tegmina (in the nominate form opaque, with light to heavy sprinkling of brown, especially on the border of the hyaline patch). The external ♂ genitalia are similar, except that the recurved apex of the stylus appears blunter than in Fennah's figure. The penis is provided with the same paired appendages (but the process 'b' is broader and dissimilarly curved apically, and the appendage 'e' is thicker and much shorter), while both in the nominate form and the subspecies *manuana* Fennah it is slender and much longer, nearly reaching the apex of the process 'd'.

Atylana rarotongae n.sp. (Fig. 9)

Length 4.25 mm (♂), 5.5–6 mm (♀). Yellow-brown. Clypeus usually infumed. Frons with abundant fuscous irroration generally visible, at least laterally. Vertex and pronotum with rather faint, fuscous irroration. Scutellum with midline, and two basal spots, embrowned (sometimes obsolescent). Tegmina shiny, in well marked specimens embrowned,



FIG. 9—*Atylana rarotongae* n.sp.: (a) genital segment from side; (b) penis, lateral aspect; (c) process no. 2 of same.

with base and a crescent-shaped transverse band at middle of corium whitish, veins darker than cells; in pale specimens, colour differences less contrasted. Undersurface and legs either partly embrowned or totally pale. Vertex $2.3 \times$ (σ) or $2.8-3.1 \times$ (ρ) as broad as long medially. Frons broadening downwards, $1.1-1.13 \times$ as broad as long at middle; lateral keels sharp, median keel evanescent, surface, especially in the median compartment, rugose. Pronotum with a faint median carina. Tegmina with cells uneven, rugose; venation reticulate, with several cross-veins in apical $\frac{1}{2}$ of corium and in clavus. Hind tibiae with two lateral spines. Male genitalia as in Fig. 9. Genital segment ventrally ecarinate.

Cook Islands (southern group): **HOLOTYPE**: Rarotonga – σ , 2.i.1938 (C. E. Clarke collection; Auckland Museum). **PARATYPES**: 2 $\rho\rho$, same data as holotype; 2 $\rho\rho$, 5.x.1937; 1 σ , 11.x.1937; 3 $\sigma\sigma$, 3 $\rho\rho$, 14.xi.1937; 1 ρ , 19.xii.1937.

REMARKS. Differing from the other species of the adjacent areas (Fennah 1950, 1956, 1967) in the σ genitalia. Four $\rho\rho$ lacking the crescent-shaped mark on the tegmen appear to belong to this species: Rarotonga – Maungatea, 4.vii.1937 and 31.vii.1937; locality unspecified, 28.vii.1937 and 13.viii.1937 (all C. E. Clarke collection).

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