

# An overview of New Zealand Deraeocorinae with descriptions of a new genus and a new species of Termatophylini (Insecta: Heteroptera: Miridae: Deraeocorinae)

Gerasimos Cassis<sup>1</sup> and Alan C. Eyles<sup>2</sup>

<sup>1</sup> Australian Museum, 6 College Street, Sydney 2010, Australia (gerry.cassis@austmus.gov.au)

<sup>2</sup> 30 Mahana Rd, Paraparaumu Beach, New Zealand (alan.pat@xtra.co.nz)

**ABSTRACT:** An overview of the New Zealand Deraeocorinae is given, and a new genus and new species, *Maoriphylina dimorpha* (Insecta: Heteroptera: Miridae: Deraeocorinae: Termatophylini), are described from New Zealand. This is the first record of the tribe for this country. The new taxa are fully illustrated, including documentation of the male and female genitalia. In addition, an updated world checklist and a key to all the genera of the tribe Termatophylini are included. *Termatophylisca septempunctata* Carvalho & Costa, 1993 is removed from the Termatophylini.

**KEYWORDS:** New Zealand, Australian region, Miridae, Deraeocorinae, Termatophylini, *Maoriphylina* new genus, *Maoriphylina dimorpha* new species, female genitalia, keys, checklists, new records.

## Introduction

The New Zealand insect fauna exhibits considerable disharmony (Hennig 1960, 1966; Macfarlane & Andrew 2001), reflecting its geographical and temporal isolation. The Heteroptera are relatively poorly represented in New Zealand, only 29 families (Larivière & Laroche 2004) having been recognised from the 84 known worldwide (Cassis & Gross 1995, 2002). As is the nature of disharmonic faunas, some taxa have radiated significantly in New Zealand, especially the Miridae: Mirinae (Eyles & Carvalho 1991, 1995), the Rhyparochromidae: Targaremini (Malipatil 1977) and the Lygaeidae: Orsillinae: *Rhyppodes* Stål (Eyles 1990). Within the Miridae: Deraeocorinae: Deraeocorini, the endemic genus *Romna* Kirkaldy, found on southern beeches (*Nothofagus* Blume) and other endemic flora, has also radiated notably (Eyles & Carvalho 1988; Eyles 2006).

The Termatophylini is a tribe of the mirid subfamily Deraeocorinae, which is found in nearly all zoogeographic

regions, apart from the Nearctic (see Appendix 1). Cassis (1995) provided a generic conspectus of the tribe, recognising eight genera and 30 species; however, he did not include the genus and species *Termatophylisca septempunctata* described by Carvalho & Costa (1993). Subsequently, *Termatophylum aeneum* was described by Nakatani (1997), and Gorczyca (1998) transferred *Seychellesius niger* (Distant, 1913) from the Cylapinae to the Termatophylini. The majority of the species of Termatophylini are restricted to the Eastern Hemisphere, and are particularly diverse in the Australian region, with numerous species from eastern Australia (Cassis 1995), Papua New Guinea and island archipelagos of Melanesia (pers. obs. of museum collections by G.C.).

This paper is part of an ongoing effort to document comprehensively the Miridae of New Zealand by A.C.E. It includes an overview of the subfamily Deraeocorinae in New Zealand, with a checklist and a key to the two tribes now represented in that subfamily. This work also includes the first record of the tribe Termatophylini in

New Zealand, represented by a new genus and a new species based on three samples from the North Island and one specimen from the South Island. Unlike the species-rich *Romna*, the new termatophyline genus is monotypic, and probably represents a relictual element of this largely circumtropical tribe. In addition, an updated world checklist and a key to all the genera of the tribe Termatophylini are included.

## Materials and methods

This work is based on an examination of 12 specimens, collected by A.C.E. or in the New Zealand Arthropod Collection (NZAC). The specimens will be deposited in the following institutions: Australian Museum (AMSA); Museum of New Zealand Te Papa Tongarewa (MONZ); and New Zealand Arthropod Collection, Landcare Research. The two-letter area codes added to the specimen data are those proposed by Crosby et al. (1976, 1998; e.g. WN for the Wellington area).

Observations were made using Leica MZ16 and Reichert stereoscopic binocular microscopes, and a Leica DMB compound microscope (Leica microscopes with a camera lucida). Measurements were taken with the Reichert microscope using a micrometer eyepiece. In the descriptions, all measurements are in millimetres, those of females within round brackets. Measurements are given as means of five specimens of each sex, with the exception of body length and width, for which ranges are given.

The male and female genitalia were prepared in 10% KOH, rinsed in distilled water, and examined in glycerol. The terminology for comparative morphological characters follows that given in Cassis (1995), and in Davis (1955) and Cassis et al. (2003) for female genitalia in particular. Scanning electron micrographs were taken using a Cambridge scanning microscope.

The description of the new genus largely follows the format used by Cassis (1995). As this genus is monotypic at present, the male and female genitalia are described in detail in the species description, on the basis that genitalia in other termatophylines appear to be species-specific. Assumptions made about genital characters having genus-level significance are based on the generic phylogeny in Cassis (1995). In the present paper, we recognise four male characters as having generic value. They are: (1) the presence or absence of tubercles in association with the genital opening of the pygophore; (2) the presence or absence of a

‘gonoporal cavity’; (3) the presence or absence, and shape, of lobal sclerites; and (4) the presence or absence of ‘fields of spines’ on the apex of the endosoma (vesica in Cassis 1995). As discussed by Cassis et al. (2003), we do not follow the nomenclature for male genitalia of Kerzhner & Konstantinov (1999), who, in some cases and largely on a functional basis, make a differentiation of the aedeagus into a proximal conjunctiva and distal vesica.

In this paper, we describe the female genitalia of a termatophyline species for the first time. Because of the lack of comparison with other termatophyline species, we refer the description of the female anatomy to the species description alone.

## Overview of New Zealand Deraeocorinae

The suprageneric classification within the subfamily Deraeocorinae is still unresolved and urgently requires reclassification based on phylogenetic techniques. Cassis (1995), while defining the Termatophylini as a monophyletic group, regarded the definitions of the remaining tribes (Clivenimini, Deraeocorini, Hyaliodini, Saturniomirini, Surinamellini) as inadequate. In particular, the nominotypical tribe, based largely on ‘absent characters’, is poorly defined. Stonedahl & Cassis (1991) indicated that the Deraeocorini was probably a paraphyletic taxon.

The Deraeocorinae are, in general terms, poorly represented in the Australian region, except for the tribes Saturniomirini and Termatophylini, the former endemic to Australia and Melanesia, and the latter being rich in species. On the basis of described taxa, the Deraeocorini are relatively depauperate in the Australian region. Besides the genera *Araspus* Distant (from New Guinea), the cosmopolitan *Deraeocoris* Kirschbaum (represented by numerous species in New Guinea, three in Australia, and one in New Zealand) and *Romna* (New Zealand), there are few radiations within the tribe Deraeocorini.

## Checklist of New Zealand Deraeocorinae

The subfamily Deraeocorinae is represented in New Zealand by the nominotypical tribe, the Deraeocorini (with four genera and 18 species), and the Termatophylini with the new genus *Maoriphylina*.

## Tribe Deraeocorini

*Deraeocoris* Kirschbaum, 1855

*D. maoricus* Woodward, 1950

*Poecilomiris* Eyles, 2006

*P. longirostris* Eyles, 2006

*P. planus* Eyles, 2006

*Reuda* White, 1878

*R. mayri* White, 1878

*Romna* Kirkaldy, 1906

*R. albata* Eyles & Carvalho, 1988

*R. bicolor* Eyles & Carvalho, 1988

*R. capsoides* (White, 1878)

*R. cuneata* Eyles & Carvalho, 1988

*R. nigrovenosa* Eyles & Carvalho, 1988

*R. oculata* Eyles & Carvalho, 1988

*R. ornata* Eyles & Carvalho, 1988

*R. pallescens* Eyles, 2006

*R. pallida* Eyles & Carvalho, 1988

*R. rubisura* Eyles, 2006

*R. scotti* (White, 1878)

*R. tenera* (Eyles, 1998)

*R. uniformis* Eyles & Carvalho, 1988

*R. variegata* Eyles & Carvalho, 1988

## Tribe Termatophylini

*Maoriphylina* Cassis & Eyles, new genus

*M. dimorpha* Cassis & Eyles, new species

## Key to tribes of New Zealand Deraeocorinae

1. First labial segment and bucculae greatly reduced in size, subequal in length, barely surpassing antennifers; callosite region demarcated posteriorly by punctate transverse margin; metathoracic spiracle exposed; dorsum with elongate setae ..... **Termatophylini**
2. First labial segment elongate, usually with bucculae much shorter than first labial segment, only rarely elongate and subequal in length, and if so extending well beyond antennifers; callosite region not marked posteriorly by distinct margin, never punctate; metathoracic spiracle recessed; dorsum at most with short setae ..... **Deraeocorini**

## Systematics

### Tribe Deraeocorini

**DIAGNOSIS:** The tribe Deraeocorini is recognised by the following combination of characters: body usually robust; elongate to ovoid; often punctate; pronotal collar usually present; callosite region variously developed, vestigial to strongly demarcated; two membrane cells usually present; metathoracic spiracle usually recessed; external efferent system of metathoracic glands usually well developed, with peritreme mostly tongue-like, often with posterior margin elevated, and found medially on metepisternum; pretarsus robust; claws often with basal thickening, tooth-like; parempodia setiform; pulvilli and pseudopulvilli absent; aedeagus mirine-like, with membranous endosoma, usually with ring-like secondary gonopore, and often with basal endosomal sclerites and/or lobal sclerites, sometimes with additional thickenings and spinosity; parameres strongly asymmetrical, left paramere often C- or L-shaped; right paramere often vestigial.

**REMARKS:** Eyles & Carvalho (1988) reviewed the Deraeocorini of New Zealand and documented the species radiation of *Romna* (12 species) and a single species each of *Reuda* and *Deraeocoris*. Larivière & Laroche (2004) catalogued the New Zealand species of Deraeocorini, and documented their synonymy, biology and distribution. Eyles (2006) described the genus *Poecilomiris* containing two new species, and two further new species of *Romna*.

### Tribe Termatophylini

**DIAGNOSIS:** The tribe Termatophylini is recognised by the following combination of characters: porrect head (Fig. 1a,b); short first labial segment, subequal in length to bucculae (Fig. 1c); elongate second labial segment (Fig. 1b); collar and callosite region distinct, each demarcated posteriorly by punctate margin (Fig. 1a); hemelytral membrane with a single cell; metathoracic spiracle exposed (Fig. 1e); external efferent system of metathoracic glands moderately developed, peritreme medial on metepisternum (Fig. 1e); claws cleft, with parempodia either setiform or flattened, ribbon-like (Fig. 1f); secondary gonopore of male aedeagus undifferentiated (Fig. 2e), with or without lobal sclerites (Fig. 2e); and, female genitalia with symmetrical sclerotised rings, but without inter-ramal lobes (Fig. 3).

**REMARKS:** The tribe Termatophylini comprises 10 genera and 33 species (Appendix 1). Cassis (1995) revised the

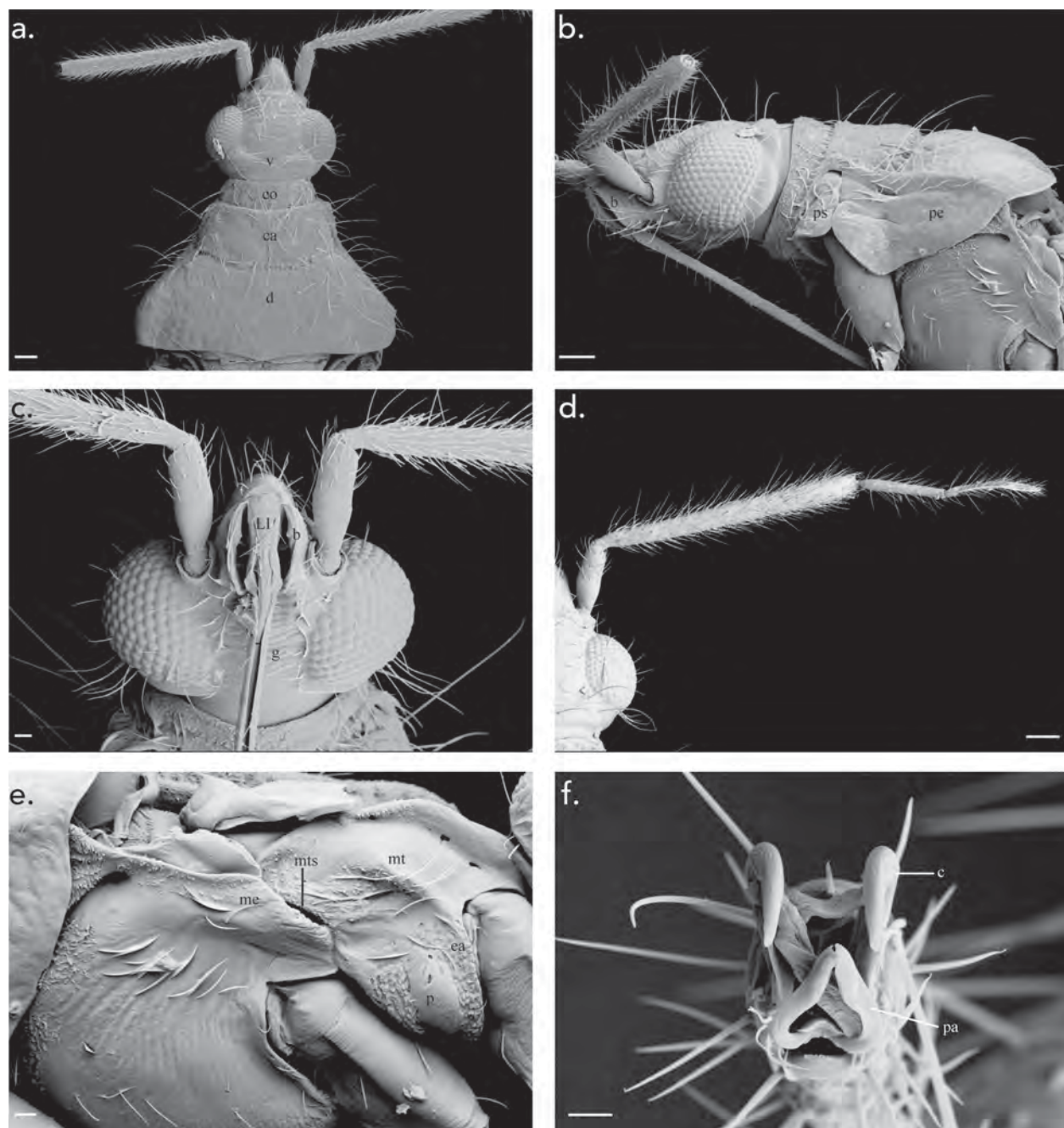


Fig. 1 *Maoriphyllina dimorpha* paratype male: a, dorsal view of head and thorax; b, lateral view of head and prothorax; c, ventral view of head; d, antenna; e, lateral view of pterothorax; f, pretarsus. Abbreviations: b = bucculae; c = claws; ca = callosite region; co = collar region; d = disc; ea = evaporative areas; g = gula; LI = first labial segment; me = mesepimeron; mt = metepisternum; mts = metathoracic spiracle; p = peritreme; pa = parempodia; pe = proepimeron; ps = proepisternum; v = vertex.



tribe and indicated centres of endemism and species richness in the Australian and Neotropical regions, with a few species in the Afrotropical and Oriental regions. In the Australian region, four genera are now represented: one in New Zealand, and three in Australia (*Democoris* Cassis, endemic to continental Australia; *Kundakimuka* Cassis, in continental Australia and Japan; and *Termatophylum* Reuter, circumtropical). The above-named three genera are represented by numerous new species in museum collections, confirming their geographical distributions as given above. The first species of Termatophylini is recorded here for New Zealand as *Maoriphylina dimorpha* new genus and new species. A checklist and a key to the world genera of Termatophylini are provided in Appendices 1 and 2, incorporating the new genus *Maoriphylina*, as well as the latest addition to the tribe, *Seychellesius*. The genus *Termatophylisca* Carvalho & Costa, 1993 was originally included in the Termatophylini. However, without examining the holotype (the only known specimen), from the original descriptions and accompanying habitus figure we conclude that *Termatophylisca* and *T. septempunctata* Carvalho & Costa, 1993 do not belong in the Termatophylini. Our reasons are: the expanded first labial segment, the lack of a deep punctate groove demarcating posterior of callosite area of pronotum, and the presence of two cells in the hemelytral membrane.

#### *Maoriphylina* new genus

(Figs 1–4)

TYPE SPECIES: *Maoriphylina dimorpha* new species, by original designation.

ETYMOLOGY: The prefix of the name *Maoriphylina* refers to the Māori, the indigenous people of New Zealand, and the suffix is taken from the name of the tribe, Termatophylini, to which this genus belongs. Gender is feminine.

DIAGNOSIS: This genus is recognised by the following combination of characters: body elongate-ovoid (Fig. 4a,b), strongly sexually dimorphic in colour (Fig. 4a,b); head strongly porrect (Fig. 1a,b), bucculae not reaching eyes in lateral view (Fig. 1b); dense distribution of elongate, simple setae (Figs 1a–c, 4a,b); punctate posterior margin of pronotal collar (Fig. 1a); undivided callosite region (Fig. 1a); transverse impression of pronotum reaching lateral margins (Fig. 1a); external efferent system of metathoracic glands moderately developed (Fig. 1e); peritreme of metathoracic glands straight (Fig. 1e); metathoracic spiracle exposed (Fig. 1e); parempodia flattened (Fig. 1f); R+M

(radius + media vein) shorter than median flexion line; aedeagus without lobal sclerites (Fig. 2e); secondary gonopore undifferentiated (Fig. 2e); sclerotised rings symmetrical (Fig. 3); and posterior wall of bursa copulatrix without inter-ramal lobes (Fig. 3).

DESCRIPTION: Males narrowly elongate-ovoid (Fig. 4a), females broadly elongate-ovoid (Fig. 4b); moderately dorsoventrally flattened; macropterous. Head: porrect (Fig. 1a,b), frons triangular, extending beyond eye by distance of dorsal eye length (Fig. 1a,b); clypeus subhorizontal (Fig. 1b); gula wrinkled, weakly concave (Fig. 1c); bucculae short, not reaching eyes in lateral view (Fig. 1b), margins weakly arcuate, not expanded or explanate (Fig. 1c); vertex weakly convex. Eyes removed from posterior margin of head (Fig. 1a,b); eyes large, extending ventrally just below gula (Fig. 1b), ommatidia large, inter-ommatidia setae present (Fig. 1c). Antennae (Fig. 1d): short; AI very short, shorter than interocular distance; AII slightly thickened in the male (Fig. 1d), two-thirds length of posterior width of pronotum; AII thin in female, weakly expanded distally; AIII and AIV very short, subequal in length, longer than interocular distance (subequal in female). Labium: relatively long, reaching just short of the posterior margin of the mesosternum; LI very short, not surpassing bucculae (Fig. 1c); LII and LIII subequal in length, longest segment, LII, reaching middle of proxyphus; LIV short, longer than LII. Pronotum: campanulate (Fig. 1a), trilobed, lateral margins subcarinate; collar robust, longer than width of AII, posterior margin punctate (Fig. 1a); callosite region demarcated laterally and posteriorly by punctate grooves (Fig. 1a), lateral grooves continuing almost to posterior margin of pronotum, posterior groove sinuate, extending anteriorly towards the sides; disc convex (Figs 1b, 4a,b), posterior margin very slightly bisinuate (almost straight) in males (Figs 1a, 4a), weakly bisinuate in females (Fig. 4b). Mesoscutum: weakly exposed in both sexes. Scutellum: medially foveate along anterior margin; lateral margins punctate; apex of male scutellum weakly swollen and pinched. Hemelytra: broad, more so in females; embolium broad, about four-fifths width of an eye (one-fifth wider than an eye in female); punctate R+M short, reaching to level of middle of claval commissure in female (and to level of its apical third in male); median flexion line elongate, surpassing apex of claval commissure; claval vein distant from claval furrow; claval commissure and scutellar margin of clavus subequal in length; cuneus large, margins roughly equidistant.

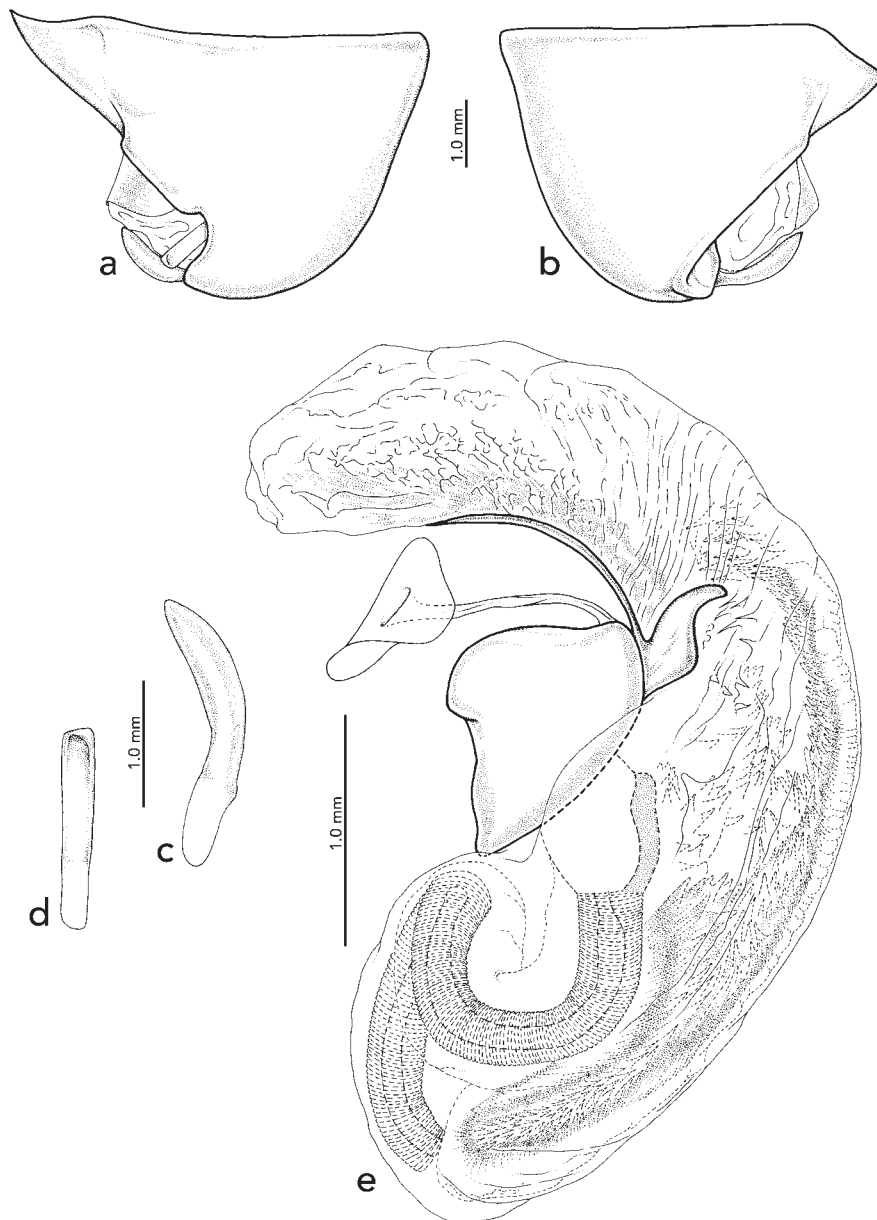


Fig. 2 Male pygophore of *Maoriphylina dimorpha*: a, right-hand view; b, left-hand view; c, left paramere; d, right paramere; e, aedeagus. Scale bars = 1 mm.

Thoracic pleura: propleural suture strongly arcuate (Fig. 1b); proepisternum anteriorly directed (Fig. 1b); proepimeron depressed (Fig. 1b); mesepimeron sub-parallelogrammatic, with caudoventral angle with evaporative areas; metathoracic spiracle exposed (Fig. 1e); external efferent system of metathoracic glands moderately sized, reaching beyond ventral margin of mesepimeron (Fig. 1e); peritreme straight, obovate, posterior margin raised, short of dorsal margin of evaporative areas (Fig. 1e). Legs: elongate, more

so hind legs, metafemora extending well beyond sides of body (Fig. 4a); metatibiae slightly arcuate; pretarsal parempodia fleshy and flattened, ribbon-like (Fig. 1f); legs unarmed.

REMARKS: This genus is very similar to the type genus of the tribe, *Termtophylum*, in that the R+M is very short, much shorter than median flexion line, and the posterior margin of the pronotal collar is punctate. *Maoriphylina* differs from *Termtophylum* by the absence of a punctate

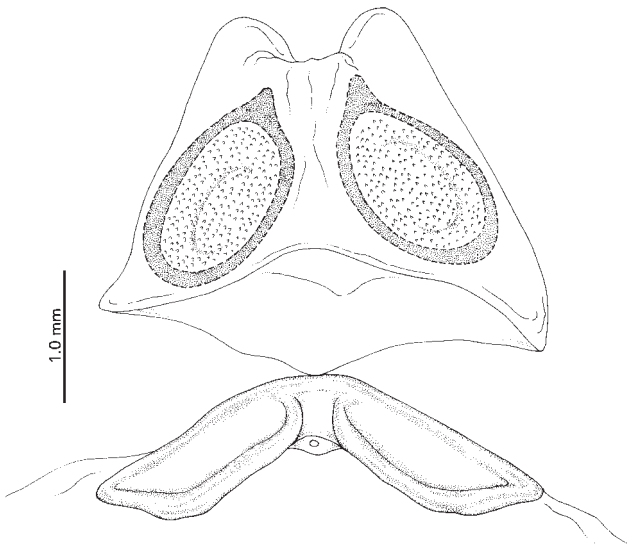


Fig. 3 Female genitalia of *Maoriphylina dimorpha*. Scale bar = 1 mm.

midline of the callosite region of the pronotum, which is similar to the condition found in *Kundakimuka*. Like these two genera, *Maoriphylina* has flattened parempodia, but they are more evenly flattened as in *Teratophylum*, rather than apically as in *Kundakimuka*. *Maoriphylina* also bears considerable similarity to *Seychellesius* Carvalho. As

in *Maoriphylina*, that genus lacks a punctate midline of the callosite region of the pronotum, however the R+M and median flexion line are equidistant.

*Maoriphylina dimorpha* new species

(Figs 1–4)

ETYMOLOGY: The epithet *dimorpha* refers to the pronounced sexual dimorphism of this species.

TYPE DATA: **Holotype** ♂ (3.91 × 1.50 mm) and **allotype** ♀ New Zealand, WN, Kaitoke Regional Park, Te Marua entrance, on *Nothofagus solandri*, 3 Jan 2005, A.C. Eyles (MONZ). **Paratypes**: 4♂, 2♀, same data as holotype; 1♂, 1 fifth instar nymph, same data except Waterworks Road entrance, 2 Jan 2000 (AMSA, MONZ, NZAC); 1♀, TO, Ohakune, on *Nothofagus solandri*, 13 Feb 1979, J.S. Dugdale (NZAC); 1♀, BR, Lewis Pass, 500 m, sweeping in bush and beside road, 19 Jan 1976, A.K. Walker (NZAC).

DIAGNOSIS: This species is recognised by the following combination of characters: sexually dimorphic in shape and colour (Fig. 4a,b); males dark brown, females orange-brown; large species; body densely covered with elongate setae (Figs 1a–c, 4a,b); genital opening of male pygophore dorso-caudal in orientation (Fig. 2a,b); parameres greatly reduced, subequal in length, left paramere weakly arcuate (Fig. 2c), right paramere straight (Fig. 2d); aedeagus with membraneous endosoma without lobal or basal sclerites



Fig. 4 *Maoriphylina dimorpha* paratypes: a, male; b, female (Ohakune); c, nymph. See text for dimensions.

(Fig. 2e); sclerotised rings strongly symmetrical, oval margins relatively thickened, medially spiculate (Fig. 3); posterior wall of bursa copulatrix without inter-ramal lobes (Fig. 3).

**DESCRIPTION:**

**Colour: Males.** Black (Fig. 4a), blackish or dark chocolate brown. Legs stramineous, with a broad red band near apex of hind femur. Head with the following dark red: eyes, posterior margin of vertex, clypeus, mandibular plates and maxillary plates. Bucculae mostly yellow, with red along base. First antennal segment (AI) brown; AII brown in at least apical quarter; AIII and AIV light brown. Labium orange, usually darker on LI and LIV. Pronotum sometimes with a yellowish-orange spot on posterior lobe about mid-longitudinal line. Apex of scutellum pale. Basal half of embolium pale or orange at least in outer half; rarely embolium with a red mid-longitudinal line. Ventral surface: thoracic area mostly orange; abdomen red.

**Females.** Bright orange (Fig. 4b). Head red. Antennae stramineous; apex of AIV dark or pale. Anterior pronotal lobe brown. Embolium with a red line along inner margin; rarely also with a red more or less mid-longitudinal line; occasionally reddish-orange down inner half and stramineous down outer half. Legs as for males. Ventral surface of abdomen yellowish-orange, with a broad red stripe following lateral margin.

**Vestiture:** Body strongly setate, with greatly elongate erect setae, intermixed with weakly flattened elongate adpressed setae. Inter-ommatidial setae present.

**Structure:** Male second antennal segment fusiform (Fig. 1d), weakly incrassate; female AII weakly expanded distally; AIII and AIV subequal in length. Labium barely reaching middle coxae. Male genitalia: pygophore conical (Fig. 2a,b); genital opening dorso-caudal; parameres simple, reduced, left paramere C-shaped (Fig. 2c); right paramere linear, rectangulate (Fig. 2d); aedeagus (Fig. 2e) bag-like, without basal or lobal sclerites; secondary gonopore not differentiated, with indistinct gonoporal cavity, continuous with more distal regions of endosoma. Female genitalia: dorsal labiate plate with prominent sclerotised rings, strongly symmetrical, oval margins relatively thickened, spiculate (Fig. 3); posterior wall of bursa copulatrix broad, sigmoid process short, weakly differentiated, inter-ramal sclerite inverted V-shape, without inter-ramal lobes (Fig. 3), surface undifferentiated, not spiculate.

**Measurements:** Length 3.75–4.05 (4.32–4.79); width 1.44–1.58 (1.94–2.20). Head: width 0.60 (0.67); length

0.60 (0.69); interocular width 0.27 (0.35). Antennae: length of segments 0.22 (0.26) : 0.86 (0.84) : 0.31 (0.33) : 0.32 (0.34). Labium length 1.30 (1.45). Pronotum: length 0.79 (0.92); width at posterior 1.19 (1.45). Scutellum: length 0.48 (0.57); width 0.59 (0.72). Corium length 1.70 (2.12). Cuneus: length 0.69 (0.80); width 0.39 (0.53).

**Nymph** (fifth instar) (Fig. 4c): Head brown, with clypeus area red. Antennae orange, first two segments darker. Pronotum brown, with some yellow on posterior margin. Scutellum area brown. Wing pads brown. Legs as in adults. Abdomen red. With long erect setae on dorsal and ventral surfaces (except ventral surface of thorax), legs and antennae. Measurements from a single nymph: total length 2.63; body width 1.47; head width 0.51; head length 0.50; interocular width 0.27; length of antennal segments: 0.22, 0.56, 0.27, 0.32; pronotum length 0.58; pronotum width at posterior 0.92; wing pad length (from pronotum) 1.40.

**DISTRIBUTION:** *Maoriophylina dimorpha* is known from the Taupo and Wellington areas of the North Island, and the Buller area of the South Island, of New Zealand.

**BIOLOGY:** Occurs on black beech, *Nothofagus solandri* (Hook. f.) Oerst. (Fagaceae).

**REMARKS:** *Maoriophylina dimorpha* is one of the most distinct species within the Termatophylini, being one of the largest species, as well as the only species with marked sexual dimorphism in shape and colour. The thick and elongate setae found over the body are also unlike the setae of any other known termatophylina species. *Maoriophylina dimorpha* also possesses distinct male genitalia, with greatly reduced parameres, particularly the left paramere, and the bag-like endosoma lacking sclerotised processes.

## Acknowledgements

We specially thank Hannah Finlay for the fine line drawings of genitalia, Sue Lindsay for assistance with the preparation of the scanning electron micrographs, and Andrew Townsend for the colour photographs. We also thank Ricardo L. Palma (Curator of Insects, MONZ) for providing facilities to A.C.E., and two anonymous referees for their improvements to the manuscript. Part of the research for this paper by A.C.E. was funded by the New Zealand Foundation for Research, Science and Technology under contract number EYLY0201.



## References

- Carvalho, J.C.M. and Costa, L.A.A. (1993). Mirideos neotropicais, 380: novos generos e especies novas de Rondonia, Brasil (Heteroptera). *Revista Brasileira de Entomologia* 37: 803–817.
- Cassis, G. (1995). A reclassification and phylogeny of the Termatophylini (Heteroptera: Miridae: Deraeocorinae), with a taxonomic revision of the Australian species, and a review of the tribal classification of the Deraeocorinae. *Proceedings of the Entomological Society of Washington* 97(2): 258–330.
- Cassis, G. and Gross, G.F. (1995). Hemiptera: Heteroptera (Coleorrhyncha to Cimicomorpha). *Zoological Catalogue of Australia* 27.3A. Melbourne: CSIRO Australia. xv + 506 pp.
- Cassis, G. and Gross, G.F. (2002). Hemiptera: Heteroptera (Pentatomomorpha). *Zoological Catalogue of Australia* 27.3B. Melbourne: CSIRO Australia. xiv + 732 pp.
- Cassis, G., Schwartz, M.D. and Moulds, T. (2003). Systematics and new taxa of the *Vannius* complex (Hemiptera: Miridae: Cylapinae) from the Australian region. *Memoirs of Queensland Museum* 49: 125–143.
- Crosby T.K., Dugdale, J.S. and Watt, J.C. (1976). Recording specimen localities in New Zealand: an arbitrary system of areas and codes defined. *New Zealand Journal of Zoology* 3: 69 + map.
- Crosby T.K., Dugdale, J.S., and Watt, J.C. (1998). Area codes for recording specimen localities in the New Zealand sub-region. *New Zealand Journal of Zoology* 25: 175–183.
- Davis, N.T. (1955). Morphology of the female organs of reproduction in the Miridae (Hemiptera). *Annals of the Entomological Society of America* 48: 132–150.
- Eyles, A.C. (1990). A review and revision of the genus *Rhyphodes* Stål (Hemiptera: Lygaeidae). *New Zealand Journal of Zoology* 17: 347–418.
- Eyles, A.C. (2006). A new genus and four new species of Deraeocorinae, Deraeocorini from New Zealand (Insecta: Hemiptera: Miridae), with notes on six other species. *Tuhinga: Records of the Museum of New Zealand Te Papa Tongarewa* 17: 27–38.
- Eyles, A.C. and Carvalho, J.C.M. (1988). Deraeocorinae of New Zealand (Miridae: Heteroptera). *New Zealand Journal of Zoology* 15: 63–80.
- Eyles, A.C. and Carvalho, J.C.M. (1991). Revision of the genus *Chinamiris* Woodward (Hemiptera: Miridae). *New Zealand Journal of Zoology* 18: 267–321.
- Eyles, A.C. and Carvalho, J.C.M. (1995). Further endemic new genera and species of Mirinae (Hemiptera: Miridae) from New Zealand. *New Zealand Journal of Zoology* 22: 49–90.
- Gorczyca, J. (1998). On the systematic position of *Seychellesius* Carvalho (Heteroptera: Miridae). *European Journal of Entomology* 95: 619–622.
- Hennig, W. (1960). – see Hennig (1966).
- Hennig, W. (1966). The Diptera fauna of New Zealand as a problem in systematics and zoogeography by Willi Hennig. [Translated from German by Pedro Wygodzinsky from Hennig, W. 1960 *Beitraege fuer Entomologie* 10(3–4): 221–329]. *Pacific Insects Monograph* 9: 1–81.
- Kerzhner, I.M. and Konstantinov, F.V. (1999). Structure of the aedeagus in Miridae (Heteroptera) and its bearing on suprageneric classification. *Acta Societas Zoologicae Bohemicae* 63: 117–137.
- Larivière, M.-C. and Laroche, A. (2004). Heteroptera (Insecta : Hemiptera): catalogue. *Fauna of New Zealand* 50: 1–330.
- Macfarlane, R.P. and Andrew, I.G. (2001). New Zealand Diptera identification, diversity and biogeography: a summary. *Records of the Canterbury Museum* 15: 33–72.
- Malipatil, M.B. (1977). The Targaremini of New Zealand (Hemiptera: Lygaeidae): a revision. *New Zealand Journal of Zoology* 4: 333–367.
- Nakatani, Y. (1997). A taxonomic study of the genus *Termatophylum* Reuter from Japan (Heteroptera, Miridae). *Japanese Journal of Entomology* 65: 593–599.
- Stonedahl, G.M. and Cassis, G. (1991). Revision and cladistic analysis of the plant bug genus *Fingulus* Distant (Heteroptera: Miridae: Deraeocorinae). *American Museum Novitates* 3028: 1–55.

## Appendix 1:

## World checklist of Termatophylini

***Arygrotelaenus* Reuter & Poppius, 1912**

<i>A. elegans</i> Reuter & Poppius, 1912	Egypt
<i>A. simoni</i> Reuter & Poppius, 1912	Middle East, Sudan

***Democoris* Cassis, 1995**

<i>D. leptocytus</i> Cassis, 1995	Australia
<i>D. lugens</i> Cassis, 1995	Australia

***Kundakimuka* Cassis, 1995**

<i>K. carvalhoi</i> Cassis, 1995	Australia
<i>K. pallipes</i> (Miyamoto, 1965)	Japan
<i>K. queenslandica</i> Cassis, 1995	Australia

***Maoriphyllina* Cassis & Eyles, 2006**

<i>M. dimorpha</i> Cassis & Eyles, 2006	New Zealand
---	-------------

***Seychellesius* Carvalho, 1988**

<i>S. niger</i> (Distant, 1913)	Seychelles
---------------------------------	------------

***Termatophyllella* Carvalho, 1955**

<i>T. fulvioides</i> Carvalho, 1955	Mexico
-------------------------------------	--------

***Termatophylidea* Reuter & Poppius, 1912**

<i>T. brunnea</i> Maldonado, 1970	Puerto Rico
<i>T. constricta</i> Maldonado, 1970	Venezuela

<i>T. hyalina</i> Maldonado, 1970	Venezuela	<i>T. grande</i> Reuter & Poppius, 1912	India
<i>T. maculata</i> Usinger, 1935	Caribbean, Central America	<i>T. hikosanum</i> Miyamoto, 1965	Japan
<i>T. ocellata</i> Carvalho, 1955	Costa Rica	<i>T. insigne</i> Reuter, 1884	Middle East, Sudan
<i>T. opaca</i> Carvalho, 1955	Guyana, Surinam	<i>T. melaleuca</i> Cassis, 1995	Australia
<i>T. pilosa</i> Reuter & Poppius, 1912	Caribbean, Central America	<i>T. montanum</i> Carvalho, 1983	Brazil
		<i>T. nigrum</i> Poppius, 1910	Kenya
		<i>T. obscurum</i> Reuter & Poppius, 1912	Sri Lanka, Indonesia
<b><i>Termatophylina</i> Carvalho, 1988</b>		<i>T. ochraceum</i> Reuter & Poppius, 1912	India
<i>T. indiana</i> Carvalho, 1988	India	<i>T. orientale</i> Poppius, 1915	Taiwan
<b><i>Termatophylodes</i> Carvalho, 1955</b>		<i>T. rhea</i> Linnavuori, 1974	Nigeria
<i>T. pilosulus</i> Carvalho, 1955	Guatemala	<i>T. turneri</i> China, 1929	South Africa
<b><i>Termatophylum</i> Reuter, 1884</b>		<i>T. weiri</i> Cassis, 1995	Australia
<i>T. aeneum</i> Nakatani, 1997	Japan	<i>T. yunnanum</i> Ren, 1983	China

## Appendix 2: Key to the genera of Termatophylini

1. Dorsum without rows of punctures on the pronotum and hemelytra ..... *Termatophylidea* (Neotropical region)
- Dorsum with punctures on pronotum and hemelytra ..... 2
2. Scale-like setae in rows on pronotum and hemelytra ..... *Arygrotelaenus* (Palearctic region)
- Always with hair-like setae, sometimes intermixed with scattered scale-like setae ..... 3
3. Punctate R+M shorter than median flexion line ..... 4
- Punctate R+M equal to or longer than median flexion line ..... 6
4. Posterior margin of pronotal collar impunctate ..... *Termatophylodes* (Guatemala)
- Posterior margin of pronotal collar punctate ..... 5
5. Midline of callosite region not punctate, at most with enlarged fovea; embolium broad, subequal to eye width; without endosomal sclerite ..... *Maoriphylina* (New Zealand)
- Midline of callosite region punctate; embolium not greatly broadened; with sickle-shaped endosomal sclerite ..... *Termatophylum* (Circumtropical)
6. Punctate R+M equal to length of median flexion line ..... *Seychellesius* (Seychelles)
- Punctate R+M longer than median flexion line ..... 7
7. Head transverse; eyes contiguous with pronotal collar, or removed from collar by less than width of second antennal segment ..... 8
- Head elongate; eyes removed from pronotal collar by more than width of second antennal segment ..... *Termatophylina* (India)
8. Bucculae broad and explanate, almost reaching antennifers ..... *Termatophylella* (Mexico)
- Bucculae not greatly expanded ..... 9
9. Metafemora incrassate, with process(es) or spines on ventral margin; body elongate to elongate-ovoid ..... *Kundakimuka* (Eastern Hemisphere)
- Metafemora not incrassate and without process(es) or spines; body ovoid ..... *Democoris* (Australia)