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RESEARCH ARTICLE

# Two new species of chewing lice in the genus *Melinirmus* (Phthiraptera, Ischnocera, Philopteridae) from Australian honeyeaters (Passeriformes, Meliphagidae)

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## Abstract

Two new species of the genus *Melinirmus* Mey, 2017, are described from Australian honeyeaters (Meliphagidae). These are: *Melinirmus coromandelica* **n. sp.** ex *Ptilotula penicillatus penicillatus* (Gould, 1837) and *Melinirmus palmai* **n. sp.** ex *Anthochaera carunculata* (Shaw, 1790). A checklist of all known species of *Brueelia*-complex chewing lice known from the Meliphagidae is provided.

## Keywords

*Brueelia*-complex, Ischnocera, new species, Psocodea, Phthiraptera.

## Introduction

Despite the large number of honeyeater (Passeriformes: Meliphagidae) species in the world (>190 species; Clements *et al.* 2021), very little is known of the chewing lice occurring on hosts of this family. To date, only 15 species of lice from 19 species of honeyeater have been published (Table 1). These include several records of the extreme host generalist amblyceran *Menacanthus eurysternus* (Burmeister, 1838),

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as well as records of two additional amblyceran and five ischnoceran genera, all of which are host-specialists as far as is known today. The genus-level diversity of lice on honeyeaters is thus remarkable, considering how few host species have been examined.

We here describe two new species of chewing lice belonging to the genus *Melinirmus* Mey, 2017, from two Australian honeyeaters. We also provide an emended description and diagnosis of the genus, based on these two species and the data provided by Mey (2017).

**Table 1.** Chewing lice (Phthiraptera) known from meliphagid hosts. Louse taxonomy follows Price et al. (2003), Mey (2004), Gustafsson & Bush (2017), and Gustafsson et al. (2019); host taxonomy follows Clements et al. (2021).

| Host species | Louse species | Source |
|---|---|---|
| *Anthochaera carunculata* (Shaw, 1790) | *Menacanthus eurysternus* (Burmeister, 1838) | Price et al. (2003) |
| *Anthochaera carunculata carunculata* (Shaw, 1790) | *Melinirmus palmai* **new species** | This paper |
| *Anthornis melanura* (Sparrman, 1786) | *Menacanthus eurysternus* (Burmeister, 1838) | Price et al. (2003) |
| *Anthornis melanura melanura* (Sparrman, 1786) | *Melibrueelia novaeseelandiae* Valim & Palma, 2015 | Valim & Palma (2015) |
| | *Myrsidea novaeseelandiae* Sychra, Kolencik & Palma, 2016 | Sychra et al. (2016) |
| *Anthornis melanura obscura* Falla, 1948 | *Melibrueelia novaeseelandiae* Valim & Palma, 2015 | Valim & Palma (2015) |
| | *Myrsidea novaeseelandiae* Sychra, Kolencik & Palma, 2016 | Sychra et al. (2016) |
| *Anthornis melanura oneho* Bartle & Sagar, 1987 | *Melibrueelia novaeseelandiae* Valim & Palma, 2015 | Valim & Palma (2015) |
| | *Myrsidea novaeseelandiae* Sychra, Kolencik & Palma, 2016 | Sychra et al. (2016) |
| *Gavicalis virescens sonorous* (Gould, 1841) | *Melinirmus mallee* Mey, 2017 | Mey (2017) |
| *Gymnomyza samoensis* (Hombron & Jacquinot, 1841) | *Guimaraesiella samoensis* (Mey, 2017) | Mey (2017) |
| *Lichenostomus melanops meltoni* (Mathews, 1912) | *Ricinus* sp. | Mey (2007) |
| *Manorina melanocephala* (Latham, 1801) | *Brueelia schoddei* (Mey, 2017)[1] | Mey (2017) |
| *Meliarchus sclateri* (Gray, 1870) | *Guimaraesiella* sp.[2] | Bush et al. (2016) |
| *Melidectes princeps* Mayr & Gilliard, 1951 | *Aratricerca macki* Gustafsson, Zou & Bush, 2022 | Gustafsson et al. (2022) |
| *Meliphaga lewinii* (Swainson, 1837) | *Guimaraesiella* sp.[2] | Bush et al. (2016) |
| *Meliphaga* sp. | *Ricinus sorus* Rheinwald, 1968 | Rheinwald (1968) |
| *Myzomela cardinalis* (Gmelin, 1788) | *Philopteroides mitsusui* (Uchida, 1948) | Uchida (1948) |
| *Nesoptilotis leucotis novaenorciae* | *Ricinus nhillensis* Mey, 2007 | Mey (2007) |
| *Philemon buceroides buceroides* (Swainson, 1837) | *Guimaraesiella timorensis* (Mey, 2017) | Mey (2017) |
| *Philemon corniculatus corniculatus* (Latham, 1790) | *Guimaraesiella pentlandiensis* (Mey, 2017) | Mey (2017) |
| *Phylidonyris novaehollandiae* (Latham, 1790) | *Menacanthus eurysternus* (Burmeister, 1838) | Price et al. (2003) |
| *Phylidonyris novaehollandiae novaehollandiae* (Latham, 1790) | *Melinirmus christidisi* Mey, 2017 | Mey (2017) |
| | *Ricinus gutheili* Mey, 2007 | Mey (2007) |
| *Prosthemadera novaeseelandiae* (Gmelin, 1788) | *Menacanthus eurysternus* (Burmeister, 1838) | Price et al. 2003 |
| *Prosthemadera novaeseelandiae novaeseelandiae* (Gmelin, 1788) | *Melibrueelia novaeseelandiae* Valim & Palma, 2015 | Valim & Palma (2015) |
| | *Myrsidea novaeseelandiae* Sychra, Kolencik & Palma, 2016 | Sychra et al. (2016) |
| *Ptiloprora guisei guisei* (De Vis, 1894) | *Aratricerca cirithra* Gustafsson & Bush, 2017 | Gustafsson & Bush (2017) |
| *Ptiloprora perstriata perstriata* (de Vis, 1898) | *Aratricerca macki* Gustafsson, Zou & Bush, 2022 | Gustafsson et al. (2022) |
| *Ptilotula penicillata* (Gould, 1837) | *Guimaraesiella* sp.[2] | Bush et al. (2016) |
| *Ptilotula penicillata penicillata* (Gould, 1837) | *Melinirmus coromandelica* **new species** | This paper |
| | *Ricinus ptilotulae* Mey, 2007 | Mey (2007) |
| *Xanthotis flaviventer* (Lesson, 1828) | *Menacanthus eurysternus* (Burmeister, 1838) | Price et al. (2003) |
| | *Ricinus tragus* Rheinwald, 1968 | Rheinwald (1968) |

[1] This species is most likely described based on stragglers from bulbuls (Pycnonotidae); see Gustafsson *et al.* (2019, 2022).

[2] Name given as *Brueelia* sp. in Bush *et al.* (2016), but nested inside *Guimaraesiella* Eichler, 1949. The specimens reported from *Meliphaga lewinii* and *Ptilotula penicillata* comprised the same species of *Guimaraesiella*, whereas the specimen from *Meliarchus sclateri* represented a separate species.

## Material and methods

Material examined was loaned from the Natural History Museum, London (NHML) or the Museum of New Zealand Te Papa Tongarewa (MONZ), as detailed below. Host taxonomy follows Clements *et al.* (2021). Terminology of setal, structural, and genital characters, and abbreviations thereof, follow Gustafsson & Bush (2017), including: *aps = accessory postspiracular seta*; *as3 = anterior seta 3*; *gpmes = gonoporal posterior mesosomal seta*; *lpmes = lateral posterior mesosomal seta*; *mms = marginal mesometathoracic seta*; *mts3 = marginal temporal seta 3*; *pns = postnodal seta*; *pos = preocular seta*; *ppss = pronotal postspiracular seta*; *psps = principal postspiracular seta*; *pst1–2 = parameral setae* 1–2*; s3–4 = head sensilla 3–4*; *ss = sutural seta*; *tps = tergal posterior seta*; *vms = vulval marginal seta*; *vos = vulval oblique seta*; *vss = vulval submarginal seta*. Abbreviations used for leg chaetotaxy follow those outlined by Gustafsson & Bush (2017). Measurements (Table 2) are given in millimeters for the following dimensions: TL = total length (along midline); HL = head length (along midline); HW = head width (at temples); PRW = prothoracic width; PTW = pterothoracic width; AW = abdominal width (at fifth segment).

### Systematics

**PHTHIRAPTERA Haeckel, 1896**
Phthiraptera Haeckel 1896: 703.

**Ischnocera Kellogg, 1896**
Ischnocera Kellogg, 1896: 63.

**Philopteridae Burmeister, 1838**
Philopteridae Burmeister, 1838: 422.

**The *Brueelia*-complex**

***Melinirmus* Mey, 2017**
*Melinirmus* Mey, 2017: 141.

**Type species:** *Melinirmus christidisi* Mey, 2017: 142, by original designation.

**Diagnosis.** *Melinirmus* is most similar to *Brueelia* Kéler, 1936 [*sensu* Gustafsson & Bush (2017)], with which it shares the following characters (note that some of these characters are not found in *B. phasmasoma* Gustafsson & Bush, 2017): marginal carina uninterrupted; dorsal preantennal suture absent; clypeo-labral suture reaches frons; *as3* absent; antennae not sexually dimorphic; *mts3* only macrosetae; antero-lateral margins of sternal plates II–III not thickened; female tergopleurite IX+X not fused with tergopleurite XI; male subgenital plate covering segments VII–XI; parameral

**Table 2.** Measurements of the known species of *Melinirmus* Mey, 2017; measurements of *M. christidisi* and *M. mallee* taken from Mey (2017; appendix 2, table 16) and included for comparison. All measurements are in millimeters, and include: TL = total length (along midline); HL = head length (along midline); HW = head width (at temples); PRW = prothoracic width; PTW = pterothoracic width; AW = abdominal width (at fifth segment).

| Species | Sex | # | TL | HL | HW | PRW | PTW | AW |
|---|---|---|---|---|---|---|---|---|
| *Melinirmus christidisi* | M | 3 | 1.55–1.66 | 0.37–0.39 | 0.33–0.34 | 0.22–0.23 | 0.27–0.29 | 0.31–0.36 |
| | F | 3 | 1.93–2.23 | 0.36–0.43 | 0.36–0.40 | 0.24–0.27 | 0.30–0.34 | 0.35–0.39 |
| *Melinirmus coromandelica* | M | 3 | 1.76–1.94 | 0.35–0.37 | 0.30–0.32 | 0.21–0.23 | 0.24–0.27 | 0.31–0.37 |
| | F | 2 | 2.28–2.29 | 0.39–0.40 | 0.36–0.37 | 0.24–0.25 | 0.29–0.30 | 0.40–0.43 |
| *Melinirmus mallee* | F | 3 | 2.26–2.36 | 0.42–0.45 | 0.40–0.41 | 0.27–0.28 | 0.34–0.35 | 0.42–0.49 |
| *Melinirmus palmai* | M | 1 | 1.80 | 0.42 | 0.37 | 0.24 | 0.29 | 0.44 |
| | F | 2 | 2.15–2.16 | 0.46 | 0.41 | 0.27 | 0.31–0.32 | 0.48–0.50 |

heads not folded medianly; gonopore terminal. These two genera can be told apart by the following characters: *pns* and *s4* present in *Melinirmus* (Figs 2A, 4A), but absent in *Brueelia*; female subgenital plate without cross-piece, and not reaching vulval margin in *Melinirmus* (Figs 2E, 4E), but with complete cross-piece that follows vulval margin in *Brueelia*; distal mesosome with rugose, fringed, or papillate area in *Brueelia*, but smooth in *Melinirmus* (Figs 2D, 4D); parameral heads with prominent, much divided fingers in *Melinirmus* (Figs 2C, 4C), but blunt or only weakly bifid in *Brueelia*.

**Description.** Head shape variable (Figs 2A, 4A). Marginal carina uninterrupted, but displaced dorsally and posteriorly at osculum; hyaline tegument fills displaced section anterior to marginal carina. Dorsal preantennal suture absent. Ventral carinae with small extension into clypeo-labral suture at anterior end of pulvinus. Head chaetotaxy as in Figs 2A, 4A; *pns* and *s3* present; *as3* absent; *pos* posterior to eye. Antennae sexually monomorphic. Temporal carinae not visible; *mts3* only macrosetae. Gular plate roughly triangular.

Prothorax (Figs 1, 3) rectangular, lateral margins convex; *ppss* on postero-lateral corners. Proepimera slender, widening medianly. Pterothorax pentagonal; lateral margins slightly divergent; posterior margin convergent to median point, however this is not always very prominent (Fig. 3A); *mms* widely separated medianly. Meso- and metasterna not fused; 1 seta on each side postero-lateral corners of each plate. Metepisterna moderate, widening medianly. Leg chaetotaxy as in Gustafsson & Bush (2017; fig. 25), except *fIv3, fIm3, fIIv2, fIIIv2* absent; *cId1, cIv3, tIIm3* not clearly visible in examined material.

Abdomen slender (Figs 1, 3). Abdominal chaetotaxy differ between species (see species accounts), but *ss*, *tps, psps,* and *aps* absent on tergopleurites II–IV in both sexes. Tergopleurites II–IX+X in male and tergopleurites II–VIII in female narrowly separated medianly, reaching ventral side of abdomen. Female tergopleurite IX+X not fused with tergopleurite XI. Pleural incrassations slender; pleural heads slender, often bend medianly. Sternal plates rectangular, except sternal plate II of both sexes with rounded anterior margin. Male subgenital plate roughly triangular, reaching posterior margin of abdomen. Female subgenital plate (Fig. 2E) long, pentagonal, not reaching vulval margin, and without cross-piece. Vulval margin with short, slender *vms* marginally, short, thorn-like *vss* submarginally, and long, slender *vos* following lateral margins of subgenital plate.

Basal apodeme (Figs 2B, 4B) rounded anteriorly, constricted at mid-length. Proximal mesosome (Figs 2D, 4D) extended anteriorly, overlapping basal apodeme; at least part of proximal mesosome with darker pigmentation than more posterior mesosome. Mesosomal lobes rounded, with distal hooks; 2 *gpmes* microsetae on each side of gonopore; 2 *lpmes* microsetae near postero-lateral corners of mesosome on each side. Ventral sclerite present (VS in Fig. 2D), extending over much of ventral mesosome anterior of gonopore. Gonopore open only distally. Parameral heads (Figs 2C, 4C) bifid. Parameral blades stout, tapering distally; *pst1* sensillus; *pst2* microsetae.

**Host distribution.** Known only from hosts in the Meliphagidae.

**Geographical range.** Known only from the Australo-Papuan region.

**Remarks.** No representative of *Melinirmus* was included in the phylogeny of Bush *et al* (2016), and its position within the *Brueelia*-complex is uncertain. Despite several attempts, we have been unable to examine any specimens of the species of *Melinirmus* described by Mey (2017). Both of these species are in need of redescription, as the photos, illustrations and descriptions in their original descriptions are inadequate.

**Included species:**
*Melinirmus christidisi* Mey, 2017: 142.
*Melinirmus coromandelica* **new species**
*Melinirmus mallee* Mey, 2017: 143.
*Melinirmus palmai* **new species**

### ***Melinirmus coromandelica*** **Gustafsson & Bush, new species**

Figs 1–2

**Type host.** *Ptilotula penicillata penicillata* (Gould 1837) – white-plumed honeyeater.

**Type locality.** Coromandel, South Australia.

**Type specimens.** Ex ***Ptilotula penicillatus penicillatus*** **[as *Lichenostomus penicillatus*]: Holotype** ♂, Coromandel, South Australia, Australia, 2-ix-1984, leg. J. Ramsey, B-38479, 24570 on reverse (NHML). **Paratypes:** 2♂, 2♀, same data as holotype, 24568–9, 24571–2 on reverse (NHML).

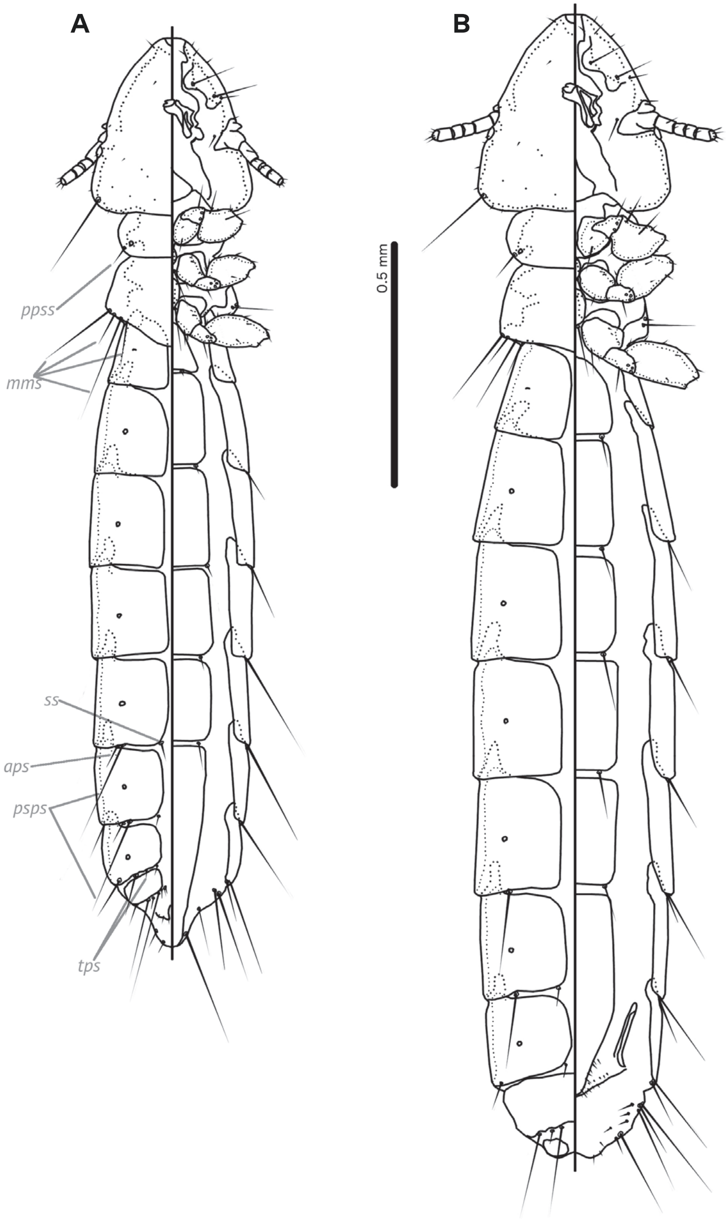

**Figure 1.** *Melinirmus coromandelica* sp. nov.: **A** Male habitus, dorsal and ventral view; **B** Female habitus, dorsal and ventral views. Abbreviations: *aps = accessory postspiracular seta*; *mms = marginal mesomethatroracic seta;* ppss = *pronotal postspiracular seta*; *psps = principal postspiracular seta*; *ss = sutural seta*; *tps = tergal posterior seta*.

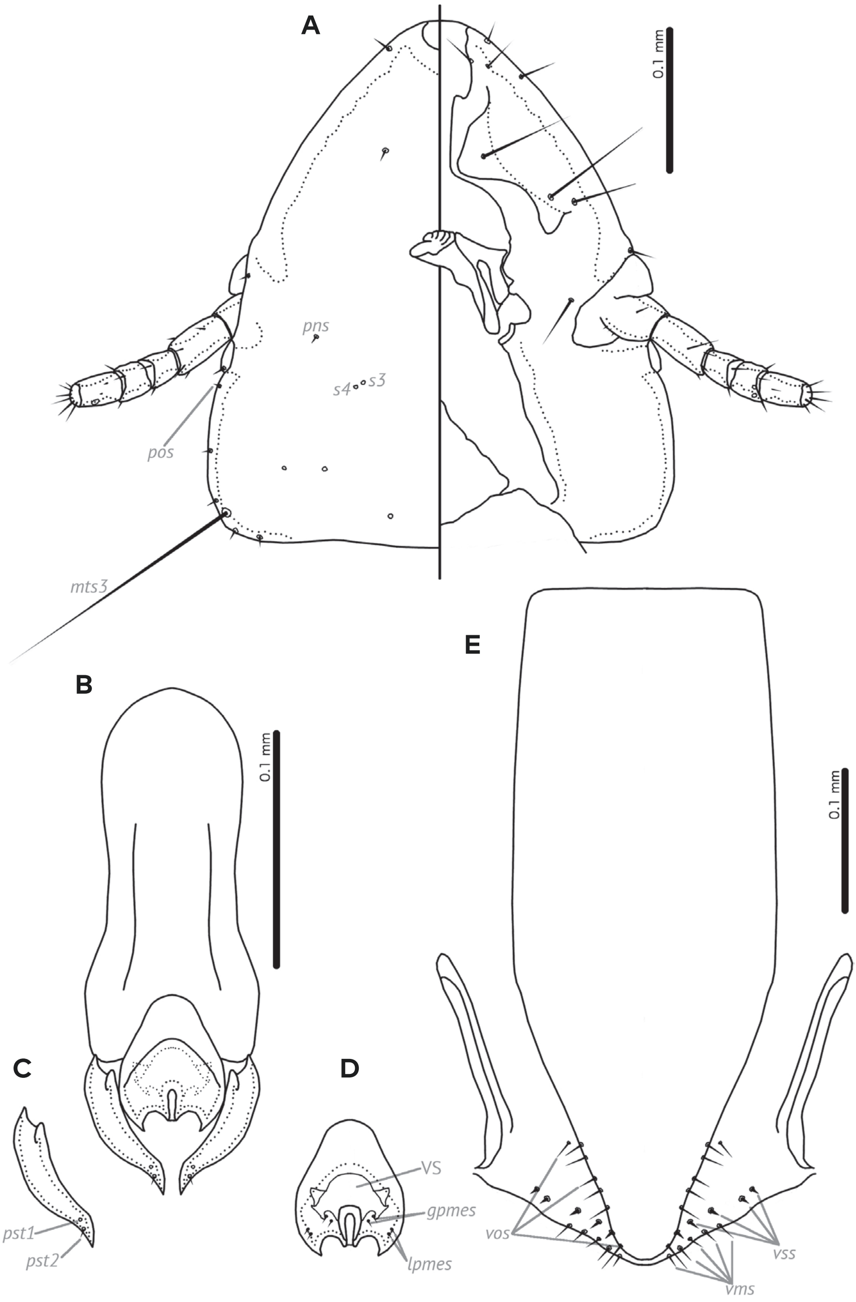

**Figure 2.** *Melinirmus coromandelica* sp. nov.: **A** Male head, dorsal and ventral sides; **B** Male genitalia, dorsal side, **C** Male paramere, dorsal side; **D** Male mesosome, ventral side; **E** Female subgenital plate and vulval margin, ventral side. Abbreviations: *gpmes = gonoporal posterior mesosomal seta*; *lpmes = lateral posterior mesosomal seta*; *mts3 = marginal temporal seta 3*; *pns = postnodal seta*; *pos = preocular seta*; *pst1–2 = parameral seta 1–2*; *s3–4 = head sensilla 3–4*; *vms = vulval marginal seta*; *vos = vulval oblique seta*; VS = ventral sclerite; *vss = vulval submarginal setae*.

**Diagnosis.** *Melinirmus coromandelica* **n. sp.** is separated from *M. palmai* **n. sp.** by the following characters: head short with narrow frons (Fig. 2A) in *M. coromandelica*, but long with broad frons (Fig. 4A) in *M. palmai*; male *M. coromandelica* without *aps* on tergopleurite V (Fig. 1A), but male *M. palmai* with *aps* on tergopleurite V (Fig. 3A); male *M. coromandelica* without *tsp* on tergopleurite VII (Fig. 1A), but male *M. palmai* with 1 *tps* on tergopleurite VII (Fig. 3A); female *M. coromadelica* without *ss* on tergopleurite VI (Fig. 1B), but female *M. palmai* with *ss* on tergopleurite VI (Fig. 3B); basal apodeme slender in *M. coromandelica* (Fig. 2B), but broad in *M. palmai* (Fig. 4B); ventral sclerite of *M. coromandelica* shaped as in Fig. 2D, but ventral sclerite of *M. palmai* shaped as in Fig. 4D. Vulval chaetotaxy largely overlapping between the two species, but *M. coromandelica* (Fig. 2E) have fewer *vss* (4–5 on each side) than *M. palmai* (Fig. 4E; 6–10 on each side).

**Description.** ***Both sexes.*** Head flat-dome shaped (Fig. 2A), lateral margins of preantennal area convex, frons narrow, rounded. Head chaetotaxy as in Fig. 2A. Gular plate roughly triangular. Thoracic and abdominal segments as in Fig. 1.

***Male.*** Thoracic and abdominal chaetotaxy as in Fig. 1A; *aps* absent on tergopleurite V; *tps* absent on tergopleurite VII. Basal apodeme slender (Fig. 2B), constructed at about mid-length. Proximal mesosome (Fig. 2D) rounded trapezoidal. Mesosomal lobes rounded, with distal hook; 2 *gpmes* microsetae on each side of gonopore; 2 *lpmes* microsetae sublaterally on each side. Gonopore slender. Ventral sclerite with narrow, angular postero-lateral ends, and gently rounded anterior margin. Parameral heads (Fig. 2C) shallowly bifid. Parameral blades stout; *pst1* sensilla, central; *pst2* microsetae, on lateral margin near distal end. Measurements as in Table 2.

***Female.*** Thoracic and abdominal chaetotaxy as in Fig. 1B; *ss* absent on tergopleurite VI. Subgenital plate (Fig. 2E) slender, pentagonal, approaching vulval margin. Vulval margin (Fig. 2E) convergent to rounded median point, with 4–5 short, slender *vms* on each side and 4–7 short, thorn-like *vss* on each side; 4–7 long, slender *vos* on each side; distal 1 *vos* median to *vss*. Measurements as in Table 2.

**Etymology.** The species epithet is derived from the type locality.

### *Melinirmus palmai* Gustafsson & Bush, new species

Figs 3–4

**Type host.** *Anthochaera carunculata carunculata* (Shaw, 1790) – red wattlebird.

**Type locality.** Victoria, Australia.

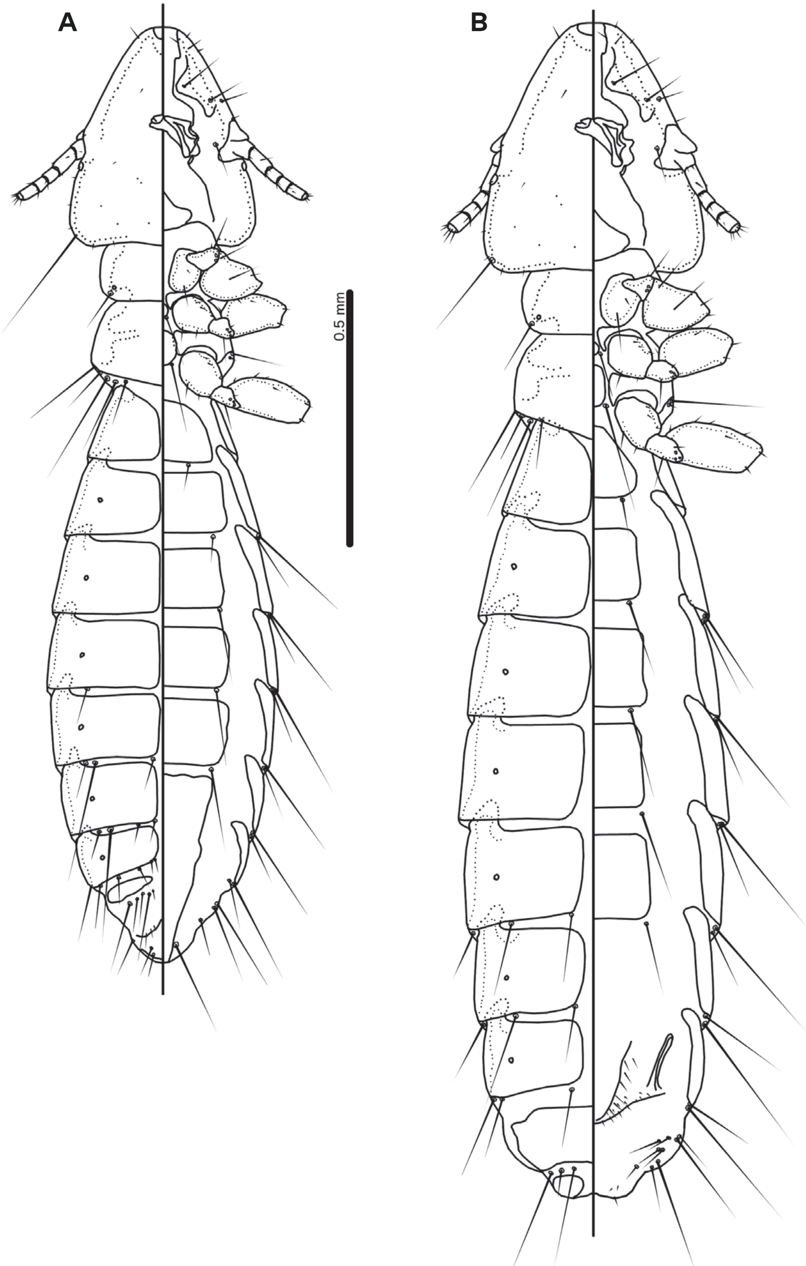

**Figure 3.** *Melinirmus palmai* sp. nov.: **A** Male habitus, dorsal and ventral view; **B** Female habitus, dorsal and ventral views.

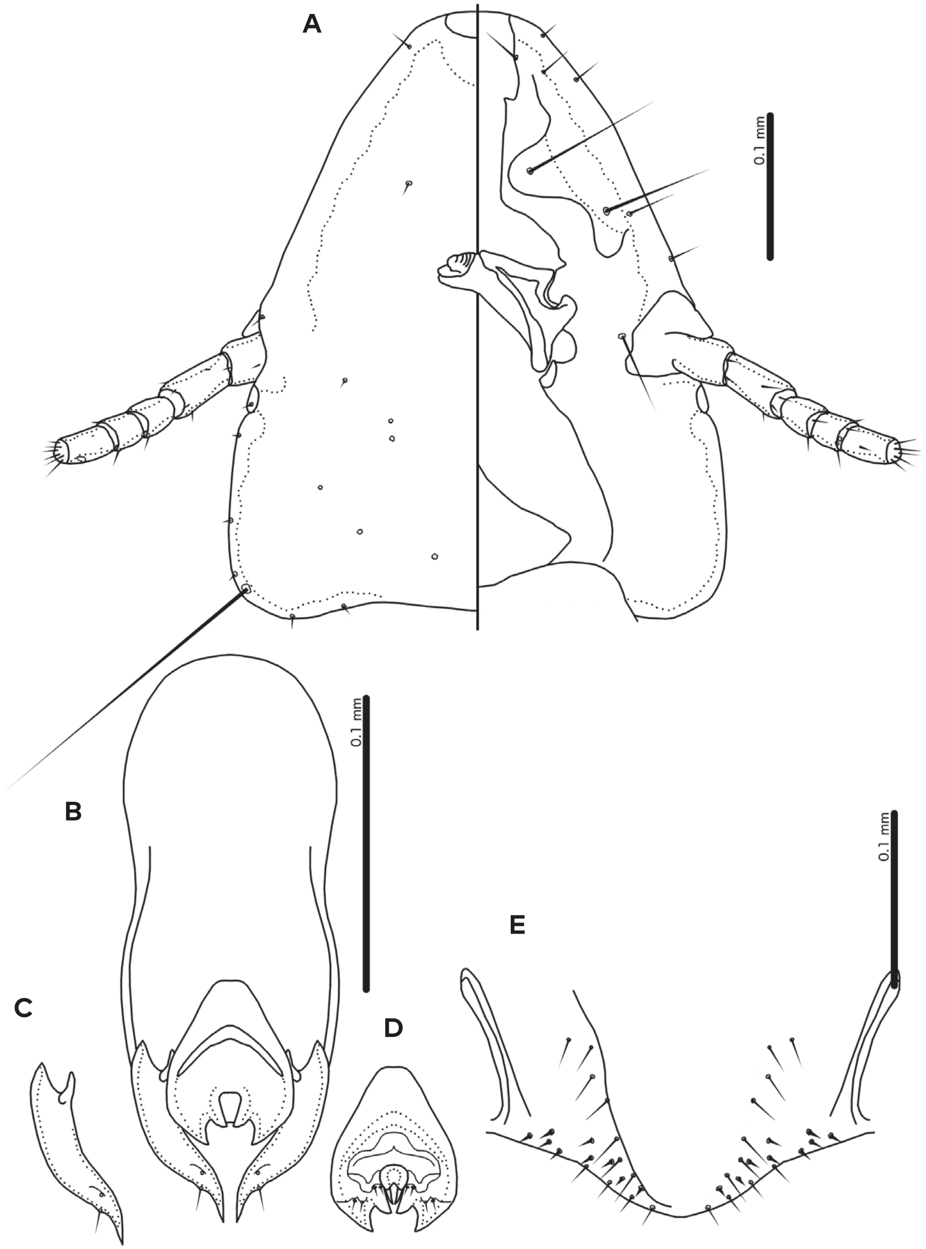

**Figure 4.** *Melinirmus palmai* sp. nov.: **A** Male head, dorsal and ventral sides; **B** Male genitalia, dorsal side; **C** Male paramere, dorsal side; **D** Male mesosome, ventral side; **E** Female subgenital plate and vulval margin, ventral side.

**Type material.** Ex ***Anthochaera carunculata carunculata*** **[as *A. carunculata*]: Holotype** ♂, Victoria, Australia, 6-ix-1975, AI.020613 (MONZ). **Paratypes:** 2♀, same data as holotype (MONZ).

**Diagnosis.** *Melinirmus palmai* **n. sp.** is separated from *M. coromandelica* **n. sp.** by the following characters: head larger and with broader frons in *M. palmai* (Fig. 4A) than in *M. coromandelica* (Fig. 2A); male *M. palmai* with *aps* on tergopleurite V (Fig. 3A), but male *M. coromandelica* without *aps* on tergopleurite V (Fig. 1A); male *M. palmai* with 1 *tps* on tergopleurite VII (Fig. 3A), but male *M. coromandelica* without *tsp* on tergopleurite VII (Fig. 1A); female *M. palmai* with *ss* on tergopleurite VI (Fig. 3B), but female *M. coromadelica* without *ss* on tergopleurite VI (Fig. 1B); basal apodeme broad in *M. palmai* (Fig. 4B), but slender in *M. coromandelica* (Fig. 2B); ventral sclerite of *M. palmai* shaped as in Fig. 4D. but ventral sclerite of *M. coromandelica* shaped as in Fig. 2D. Female *M. palmai* with 6–10 *vss* on each side (Fig. 4E), but female *M. coromandelica* (Fig. 2E) with 4–5 *vss* on each side; vulval chaetotaxy otherwise overlapping between the two species.

**Description.** ***Both sexes.*** Head slenderly concave-dome shaped (Fig. 4A), lateral margins of preantennal area slightly convex, frons broadly flattened. Head chaetotaxy as in Fig. 4A. Gular plate roughly triangular, with concave lateral margins. Thoracic and abdominal segments as in Fig. 3.

***Male.*** Thoracic and abdominal chaetotaxy as in Fig. 3A; *aps* present on tergopleurite V; *tps* present on tergopleurite VII. Basal apodeme (Fig. 4B) broad, slightly constructed at about mid-length. Proximal mesosome (Fig. 4D) trapezoidal. Mesosomal lobes rounded, with prominent hooks distally; 2 *gpmes* microsetae on each side of gonopore; 2 *lpmes* centrally distal to gonopore. Gonopore slender. Parameral heads (Fig. 4C) deeply bifid. Parameral blades stout; *pst1* sensilla, central, not close to *pst2*, which are microsetae on lateral margins. Measurements as in Table 2.

***Female.*** Thoracic and abdominal chaetotaxy as in Fig. 3B; *ss* present on tergopleurite VI. Subgenital plate with very pale pigmentation, and cannot be illustrated accurately. Vulval margin bulging medianly (Fig. 4E), with 4–5 short, slender *vms* on each side, and 8–10 (on one side in one female 6) short, thorn-like *vss* on each side; 5–7 long, slender *vos* on each side; distal 2–3 *vos* median to *vss*, not separated from more anterior *vos* by distinct gap. Measurements as in Table 2.

**Etymology.** The species epithet in honour of our friend and colleague Ricardo Palma (Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand) in recognition of his innumerable and diverse contribution to the study of chewing lice, and his continued assistance and friendship throughout the years. In addition, Ricardo kindly lent us the material on which this description is based.

## Discussion

The honeyeaters occupy a distinct branch within the passeriform radiation (Gardner *et al.* 2010; Marki *et al.* 2016; Oliveros *et al.* 2019). The family is largely restricted to the Australo-Papuan region, an area with a traditionally neglected chewing louse fauna. For instance, until 2014 only a single ischnoceran species of louse was known from any honeyeater, *Philopteroides mitsusui*. Since 2014, a small number of ischnoceran lice have been described from meliphagid hosts, including representatives of at least three genera, two of which (*Melibrueelia* and *Melinirmus*) are presently known only from honeyeaters. This suggests that honeyeaters harbour a diverse louse fauna that are presently largely unknown (Table 1).

The known species of ischnoceran lice on honeyeaters are widely distributed across the group (Table 3), with only a single louse genus known from most of the

**Table 3.** Distribution of ischnoceran louse genera on different major clades of honeyeaters (Meliphagidae). Host clade designations primarily follows the placement of genera in Andersen *et al.* (2014; clades designated by letter before dash), but are complemented by the clades of Marki *et al.* (2017), which included additional taxa [clades designated by letter after dash; taxa included by Marki *et al.* (2017) but not by Andersen *et al.* (2014) are placed in parentheses]. Note that some host genera were found to be paraphyletic in one or both of these analyses, but these taxa are still treated as congeneric by Clements *et al.* (2021).

| Clade | Host genera included | *Aratricerca* | *Guimaraesiella* | *Melibrueelia* | *Melinirmus* | *Philopteroides* |
|---|---|---|---|---|---|---|
| A–G | (*Melitograis*,) *Myzomela*, *Sugomel*, *Vosea* | | | | | X |
| B–D | *Gliciphila*, *Glycichaera*, *Glycifohia*, *Ptiloprora* | X | | | | |
| C–D | *Ashbyia*, *Conopophila*, *Epthianura*, (*Macgregoria*,) *Melilestes*, *Melipotes*, *Ramsayornis*, *Stresemannia*, *Timeliopsis* | | | | | |
| D–F+G | *Cissomela*, *Lichmera*, *Phylidonyris*, *Trichodere* | | | | X | |
| E–G | *Grantiella*, *Philemon*, *Plectorhyncha*, *Xanthotis* | | X | | | |
| F–B+C | *Acanthorhynchus*, *Anthornis*, *Certhionyx*, *Prosthemadera*, *Pycnopygius* | | | X | | |
| G–D+E | *Acanthagenys*, *Anthochaera*, *Bolemoreus*, *Caligavis*, *Gavicalis*, *Lichenostomus*, *Manorina*, *Melidectes*, *Meliphaga*, (*Oreornis*,) *Ptilotula*, *Purnella*, *Stomioptera* | X | X | | X | |
| H–F | *Entomyzon*, *Foulehaio*, *Guadalcanaria*, *Gymnomyza*, *Meliarchus*, *Meliphacator*, *Melithreptus*, *Nesoptilotis* | | X | | | |
| N/A–A | (*Myza*) | | | | | |

major radiations. Overall, too few species of lice are known from honeyeaters for any patterns of host associations to be discernible. However, honeyeaters in Clade G *sensu* Andersen *et al.* (2014) are collectively known to be associated with three different louse genera. Moreover, three of the four *Brueelia*-complex louse genera reported from honeyeaters are known from more than one of the major clades within the Meliphagidae. This likely indicates that our lack of knowledge is due to the historical paucity of research programs targeting passerines more broadly in Australia, Wallacea, and the South Pacific, where honeyeaters are most common. More collections from throughout the range of this family are needed, and will likely shed considerable light on the formation of host association patterns of avian chewing lice.

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## References

Andersen MJ, Naikatini A, Moyle RG (2014) A molecular phylogeny of Pacific honeyeaters (Aves: Meliphagidae) reveals extensive paraphyly and an isolated Polynesian radiation. Molecular Phylogenetics and Evolution 71: 308–315.

Burmeister H (1838) Mallophaga Nitzsch. In: Handbuch der Entomologie, Zweite Abhandlung. Besondere Entomologie. Zweite Abteilung. Lauskerfe. Gymnognatha (Zweiter Hälfte; vulgo Neuroptera). Theod. Chr. Fried. Enslin, Berlin 2(1): 418–443.

Bush SE, Weckstein JD, Gustafsson DR, Allen J, DiBlasi E, Shreve SN, Boldt R, Skeen HR, Johnson KP (2016) Unlocking the black box of feather louse diversity: a molecular phylogeny of the hyper-diverse genus *Brueelia*. Molecular Phylogenetics and Evolution 94: 737–751.

Clements JF, Schulenberg TS, Iliff MJ, Roberson D, Fredericks TA, Sullivan BL, Wood CL (2021) The eBird/Clements checklist of birds of the world. Version 2021. Available from: http://www.birds.cornell.edu/clementschecklist/download/ (accessed 3 March 2022).

Eichler W (1949) Phthirapterorum nova genera. Bolletina di Societas Entomologica di Italia 79: 11–13.

Gardner JL, Trueman JWH, Ebert D, Joseph L, Magrath RD (2010) Phylogeny and evolution of the Meliphagoidea, the largest radiation of Australasia songbirds. Molecular Phylogenetics and Evolution 55: 1087–1102.

Gustafsson DR, Bush SE (2017) Morphological revision of the hyperdiverse *Brueelia*-complex (Phthiraptera: Ischnocera: Philopteridae) with checklists and generic keys. Zootaxa 4313: 1–443.

Gustafsson DR, Bush SE, Palma RL (2019) The genera and species of the *Brueelia*-complex (Phthiraptera: Philopteridae) described by Mey (2017). Zootaxa 4615: 252–284.

Gustafsson DR, Zou F, Bush SE (2022) Descriptions of six new species of slender-bodied chewing lice of the *Resartor*-group (Phthiraptera: Ischnocera: *Brueelia*-complex). Zootaxa 5104: 506–530.

Haeckel E (1896) Systematische Phylogenie. 2. Teil. Systematische Phylogenie der wirbellose Thiere (Invertebrata). Verlag von Georg Reimer, Berlin, 720 pp. [in German]

Kéler S von (1936) Über einige Mallophagen aus Rossitten. Arbeiten in morphologische und taxonomische Entomologie von Berlin-Dahlem 3: 256–264. [in German]

Kellogg VL (1896) New Mallophaga, I, ––with special reference to a collection made from maritime birds of the Bay of Monterey, California. Proceedings of the California Academy of Sciences (Series 2) 6,:31–168, 14 pls.

Marki PZ, Jønsson KA, Irestedt M, Nguyen JMT, Rahbek C, Fjeldså J (2017) Supermatrix phylogeny and biogeography of the Australasian Meliphagides radiation (Aves: Passeriformes). Molecular Phylogenetics and Evolution 107: 516–529.

Mey E (2004) Zur Taxonomie, Verbreitung und parasitophyletischer Evidenz des *Philopterus*-Komplexes (Insecta, Phthiraptera, Ischnocera), Ornithologischer Anzeiger 43: 149–203. [in German]

Mey E (2007) *Ricinus gutheili* nov. spec. und weitere neue australische und neuguineische *Ricinus*-Arten (Insecta, Phthiraptera, Amblycera) aus dem Naturhistorischen Museum in Rudolstadt (Thüringen). Rudolstädter Naturhistorische Schriften 14: 27–42. [in German]

Mey E (2017) Neue Gattungen und Arten aus dem *Brueelia*-Komplex (Insecta, Phthiraptera, Ischnocera, Philopteridae s. l.). Rudolstädter Naturhistorische Schriften 22: 85–215. [in German]

Oliveros CH, Field DJ, Ksepka DT, Barker FK, Aleixo A, Andersen MJ, Alström P, Benz BW, Braun EL, Braun MJ, Bravo GA, Brumfield RT, Chesser RT, Claramunt S, Cracraft J, Cuervo AM, Derryberry EP, Glenn TC, Harvey MG, Hosner PA, Joseph L, Kimball RT, Mack AL, Miskelly CM, Paterson AT, Robbins MB, Sheldon FH, Silveira LF, Smith BT, White ND, Moyle RG, Faircloth BC (2019) Earth history and the passerine superradiation. Proceedings of the National Academy of Sciences of the USA 116: 7916–7925.

Price RD, Hellenthal RA, Palma RL (2003) World checklist of chewing lice with host associations and keys to families and genera. In: Price RD, Hellenthal RA, Palma RL, Johnson KP, Clayton DH (Eds) The Chewing lice: world checklist and biological overview. Illinois Natural History Survey Special Publication 24. x + 501 pp.

Rheinwald G (1968) Die Mallophagengattung *Ricinus* De Geer, 1778. Revision der außeramerikanischer Arten. Mitteilungen aus der Hamburger Zoologische Museum Institiut 65: 181–326. [in German]

Sychra O, Kolencik S, Palma RL (2016) Three new species of *Myrsidea* (Phthiraptera: Menoponidae) from New Zealand passerines (Aves: Passeriformes). Zootaxa 4126: 397–410.

Uchida S (1948) Studies on the biting-lice (Mallophaga) of Japan and adjacent territories (Suborder Ischnocera Pt. I). Japanese Medical Journal 1: 303–326.

Valim MP, Palma RL (2015) A new genus and two new species of feather lice (Phthiraptera: Ischnocera: Philopteridae) from New Zealand endemic passerines (Aves: Passeriformes). Zootaxa 3926: 480–498.