Tuhinga 21: 135–146

The species of *Myrsidea* Waterston (Insecta: Phthiraptera: Menoponidae) from the Galápagos Islands, with descriptions of new taxa

Ricardo L. Palma* and Roger D. Price**

* Museum of New Zealand Te Papa Tongarewa, PO Box 467, Wellington, New Zealand (ricardop@ tepapa.govt.nz)
** 1409 Burnham Court, Fort Smith, Arkansas 72903, United States of America (rpricelice2@aol.com)

ABSTRACT: Three species and one subspecies of lice in the genus *Myrsidea* are described and illustrated from passerine hosts from the Galápagos Islands. New taxa are: *Myrsidea darwini* new species (type host *Geospiza fuliginosa* Gould, Emberizidae); *Myrsidea nesomimi nesomimi* new species and subspecies (type host *Nesomimus macdonaldi* Ridgway, Mimidae); and *Myrsidea nesomimi borealis* new subspecies (type host *Nesomimus parvulus* (Gould), Mimidae). *Myrsidea ridulosa* (Kellogg & Chapman) is recorded for the first time in the Galápagos Islands, from *Dendroica petechia aureola* (Gould) (Parulidae). *Myrsidea nesomimi* is the first species of *Myrsidea* described from members of the family Mimidae.

KEYWORDS: Phthiraptera, Menoponidae, *Myrsidea*, lice, new taxa, new record, Galápagos Islands, Darwin's finches, Galápagos mockingbirds, yellow warbler.

Introduction

The genus *Myrsidea* Waterston, 1915 is one of the most speciose among lice, comprising species parasitic on hosts belonging to the avian orders Passeriformes, Piciformes and Apodiformes. Since the publication of a world checklist by Price *et al.* (2003), where 208 species were listed as valid, there have been over 100 other species described as new (e.g. Dalgleish & Price 2003, 2004, 2005; Hellenthal & Price 2003, 2005; Price *et al.* 2004, 2005; Johnson & Price 2006; Price & Dalgleish 2006, 2007; Price & Johnson 2006a,b; Sychra *et al.* 2006).

In two papers dealing with lice from the Galápagos Islands (Kellogg & Kuwana 1902: 488; Kellogg 1906: 322), the authors identified many specimens from several passerine hosts – and from some seabirds – as *Menopon incertum* Kellogg, 1896. Subsequently, in a major list of insect species recorded from the Galápagos Islands, Linsley & Usinger (1966: 128) updated the louse taxonomy and listed the same species as *Myrsidea incerta* (Kellogg, 1896), a species also recognised as belonging to *Myrsidea* by Clay (1966: 349) and Price *et al.* (2003: 129). However, our study of many samples and specimens of *Myrsidea* recently collected from several species of Darwin's finches, mockingbirds and the yellow warbler in the Galápagos Islands shows that they are not *M. incerta* (as redescribed by Clay 1966: 349), but represent four different taxa, three species and one subspecies, of which two species and one subspecies are new to science. In this publication, we describe and name the three new taxa, and redescribe and record a known species for the first time in the Galápagos Islands.

Material and methods

All lice studied and included in this paper were collected in the Galápagos Islands, originating from four sources, as follows:

1. Samples collected by the senior author and other members of the '*Grupo Peck*' in March–April 1992. Birds

were captured in the field alive, deloused with a mild insecticide, and released. Most of these specimens will remain in the collection of the Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand (MONZ), while some will be deposited in the Charles Darwin Research Station, Puerto Ayora, Isla Santa Cruz, Galápagos Islands, Ecuador (CDRS).

2. The Kellogg collection of the Essig Museum, Division of Entomology and Parasitology, University of California, Berkeley, California, USA (CISC). Additional collection data for these specimens, given in square brackets, were downloaded from the ornithology database of the California Academy of Sciences and compiled by Robert C. Dalgleish (San Diego, California, USA). Many specimens of this collection are stragglers or contaminants, as discussed by Palma (1994: 273).

3. Samples collected by Noah K. Whiteman and Jennifer L. Bollmer from live birds in the field during 2003 and 2004, and donated to the senior author to be deposited in the collection of the Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand (MONZ).

4. Samples collected by Paquita Hoeck from live birds in the field during 2006 and 2008, and donated to the senior author by Vincent S. Smith to be deposited in the collection of the Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand (MONZ).

The lice in samples (1), (3) and (4) above were slide-mounted using the technique described by Palma (1978). Specimens in (2), the Kellogg Collection, were originally mounted in glycerol and had dried and shrunk. They were remounted in Canada balsam by the senior author following the same technique as for the other samples.

In the following descriptions, all measurements are in millimetres. Abbreviations are TW, temple width; HL, head length; PW, prothorax width; PSL, prosternal plate length; MSL, metasternal plate length; MW, metathorax width; AWIV, abdomen width at segment IV; ANW, female anus width; GL, male genitalia length; GSL, genital sac sclerite length; and TL, total length. Tergal setal counts include the postspiracular setae and all setae between them. Host classification and nomenclature follow Dickinson (2003), but we have not identified the subspecies of *Nesomimus parvulus* (Gould, 1837), *Camarhynchus psittacula* Gould, 1837 or *Camarhynchus pallidus* (Sclater & Salvin, 1870).

Systematics

Genus *Myrsidea* Waterston

Myrsidea Waterston 1915: 12. Type species: *Myrsidea victrix* Waterston, 1915, by original designation.

Clay (1966) provides a detailed morphological description of this genus.

***Myrsidea darwini* new species**

(Figs 1–5)

'*Menopon incertum*' Kellogg & Kuwana, 1902: 488 (not *Menopon incertum* Kellogg, 1896).

'*Myrsidea incerta*' Linsley & Usinger, 1966: 128 (not *Menopon incertum* Kellogg, 1896).

TYPE HOST: *Geospiza fuliginosa* Gould, 1837 – 'Small ground finch'.

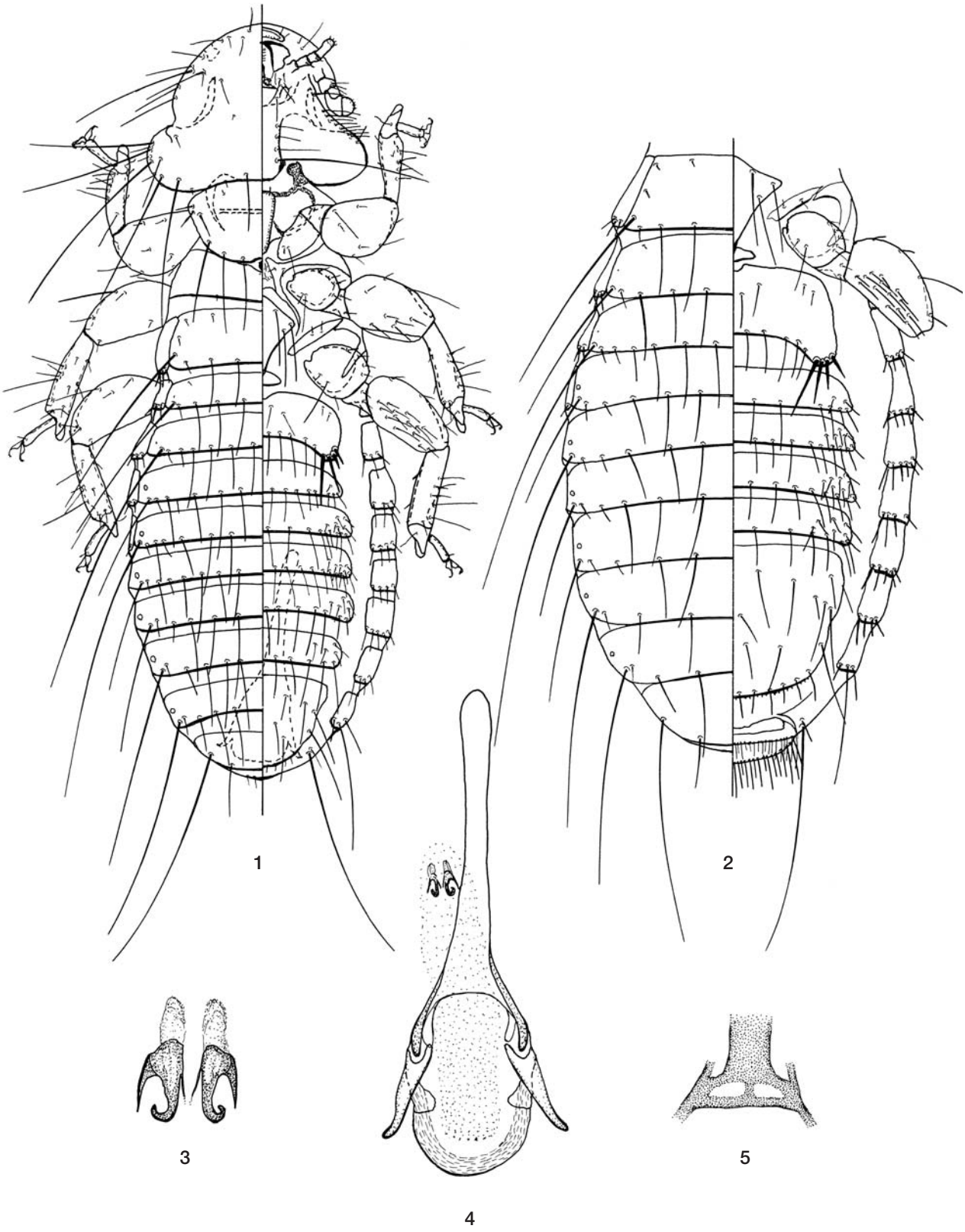
DESCRIPTION:

Female

Metathorax and abdomen as in Fig. 2. Hypopharyngeal sclerites weak, as in Fig. 5. Gula with 4+4 setae, except for a few specimens with 4+3 or 4+5 setae. Pronotum with 12 marginal setae. Metanotum not enlarged, with 8 marginal setae. Metasternal plate with 5–6 setae. Abdomen with all tergites unmodified. Tergal setae: I, 9–11; II–III, 12–15; IV, 11–13; V, 10–12; VI, 9–10; VII, 7–8; VIII, 8. Postspiracular setae extremely long on II and IV, very long on VII–VIII, long on I, and shortest on III and V–VI. Sternal setae: sternum I very small without setae; II, aster with 4+4 setae, less often 4+3 or 3+3, also with 8–11 marginal and 7–11 anterior setae; III, 16–21; IV, 27–31; V, 28–34; VI, 19–26; VII, 12–15; VIII–IX of subgenital plate, 16–20. Anus with 29–36 dorsal fringe setae and 30–35 ventral setae. Dimensions: TW, 0.38–0.40; HL, 0.28–0.31; PW, 0.26–0.28; PSL, 0.10–0.11; MSL, 0.14–0.16; MW, 0.39–0.42; AWIV, 0.58–0.63; ANW, 0.19–0.20; TL, 1.40–1.48.

Male

As in Fig. 1. Hypopharyngeal sclerites as in female. Gula with 4+4 setae, except for one specimen with 4+3. Pronotum with 12 marginal setae. Metanotum not enlarged, with 8 marginal setae. Metasternal plate with 4–6 setae. Abdomen with all tergites unmodified. Tergal setae: I, 11; II–III, 14–15; IV, 12–15; V, 13–16; VI–VII, 12–14; VIII, 9–10. Postspiracular setae as in female. Sternal setae: sternum I as in female; II, aster with 4+4 setae, less often 4+3 or 3+3, also with 9–10 marginal and 8 anterior setae; III, 16–21; IV, 29–31; V, 29–35; VI, 23–27; VII, 15–18; VIII, 5–9. Genitalia as in Fig. 4. Genital sac sclerite as in Fig. 3. Dimensions: TW, 0.36–0.39; HL, 0.26–0.28; PW, 0.23–0.25; PSL, 0.09–0.10; MSL, 0.13–0.14; MW,



Figs 1–5 *Myrsidea darwini*: 1, dorsoventral view of male; 2, dorsoventral view of female metathorax and abdomen; 3, male genital sac sclerite; 4, male genitalia; 5, female hypopharyngeal sclerites.

0.33–0.37; AWIV, 0.43–0.47; GL, 0.36–0.40; GSL, 0.6; TL, 1.20–1.24.

MATERIAL EXAMINED:

Type material

Ex *Geospiza fuliginosa* Gould, 1837 – 'Small ground finch'. **Holotype** ♀ (MONZ, AI.020541) and 3♂, 4♀ paratypes, Isla Pinta (in bush, 200 m a.s.l.), 17 Mar. 1992, R.L. Palma (MONZ, AI.020303). Other paratypes: 2♀, Charles Darwin Research Station, Isla Santa Cruz, 5 Mar. 1992, R.L. Palma & E.M. Inca (MONZ, AI.020302); 3♂, 5♀, Isla Pinta (in bush, 350 m a.s.l.), 18 Mar. 1992, R.L. Palma & E.M. Inca (MONZ, AI.020304; CDRS); 4♀, Bahía Manzanillo, Isla Española, 24 Apr. 1992, R.L. Palma (MONZ, AI.020305).

Non-types

Ex *Geospiza magnirostris* Gould, 1837 – 'Large ground finch'. 2♀, Playa Negra, Isla Marchena, 24 Mar. 1992, R.L. Palma & E. Vilema (MONZ, AI.020306).

Ex *Camarhynchus psittacula* Gould, 1837 – 'Large tree finch'. 1♂, 4♀, Isla Pinta (in bush, 200 m a.s.l.), 17 Mar. 1992, R.L. Palma & E.M. Inca (MONZ, AI.020307).

ETYMOLOGY: The epithet *darwini* is a noun in the genitive case after Charles Darwin. In addition, it refers to the collective vernacular name given to the hosts of this louse species, i.e. Darwin's finches.

REMARKS: During the 1992 Galápagos Expedition, a total of 265 specimens of Darwin's finches belonging to 12 species were searched for lice. *Myrsidea* were found on 17 (6.4 %) birds of three species. The extreme paucity and low abundance of this louse genus on Darwin's finches contrasts with the much higher number of *Myrsidea* specimens found on the four species of Galápagos mockingbirds (see below).

Among the species of *Myrsidea* parasitic on members of the passerine family Emberizidae, *Myrsidea darwini* n.sp. belongs to the '*serini* species group' as defined by Price & Dalgleish (2007: 12). It can be separated from the three species in that group by having fewer metanotal and abdominal setae, by the relative length of the postspiracular setae, and by details of the male genital sac sclerite: compare Fig. 3 with fig. 2B in Klockenhoff (1984) for *Myrsidea serini* (Séguy, 1944), and fig. 44 in Price & Dalgleish (2007) for *Myrsidea anoxanthi* Price & Dalgleish, 2007.

***Myrsidea nesomimi* new species**

***Myrsidea nesomimi nesomimi* new subspecies**

(Figs 6–10)

'*Menopon incertum*' Kellogg & Kuwana, 1902: 488 (not *Menopon incertum* Kellogg, 1896).

'*Myrsidea incerta*' Linsley & Usinger, 1966: 128 (not *Menopon incertum* Kellogg, 1896).

Myrsidea sp.; Parker *et al.* 2006: 630.

TYPE HOST: *Nesomimus macdonaldi* Ridgway, 1890 – 'Hood mockingbird'.

DESCRIPTION:

Female

Metathorax and abdomen as in Fig. 7. Hypopharyngeal sclerites well developed, as in Fig. 10. Gula with 5+5 or 5+4 setae, except for a few specimens with 4+4. Pronotum with 12–13 marginal setae. Metanotum slightly enlarged, with 10–14 marginal setae. Metasternal plate mostly with 5–6 setae, rarely 7–10. Abdomen with tergites I–V modified, especially I. Tergal setae: I, 6; II–III, 14–20; IV, 12–18; V–VI, 14–21; VII, 12–19; VIII, 8–9. Postspiracular setae extremely long on II and IV, very long on I and VIII, long on VII, shortest on III and V–VI. Sternal setae: sternum I very small without setae; II, aster with 4+4 setae, rarely 4+3 or 4+5, also with 14–18 marginal and 9–19 anterior setae; III, 27–32; IV, 38–50; V, 39–52; VI, 36–47; VII, 21–29; VIII–IX of subgenital plate, 19–29. Anus with 36–44 dorsal fringe setae and 31–38 ventral setae. Dimensions: TW, 0.47–0.51; HL, 0.33–0.36; PW, 0.30–0.32; PSL, 0.11–0.12; MSL, 0.15–0.17; MW, 0.48–0.54; AWIV, 0.60–0.70; ANW, 0.21–0.24; TL, 1.59–1.72.

Male

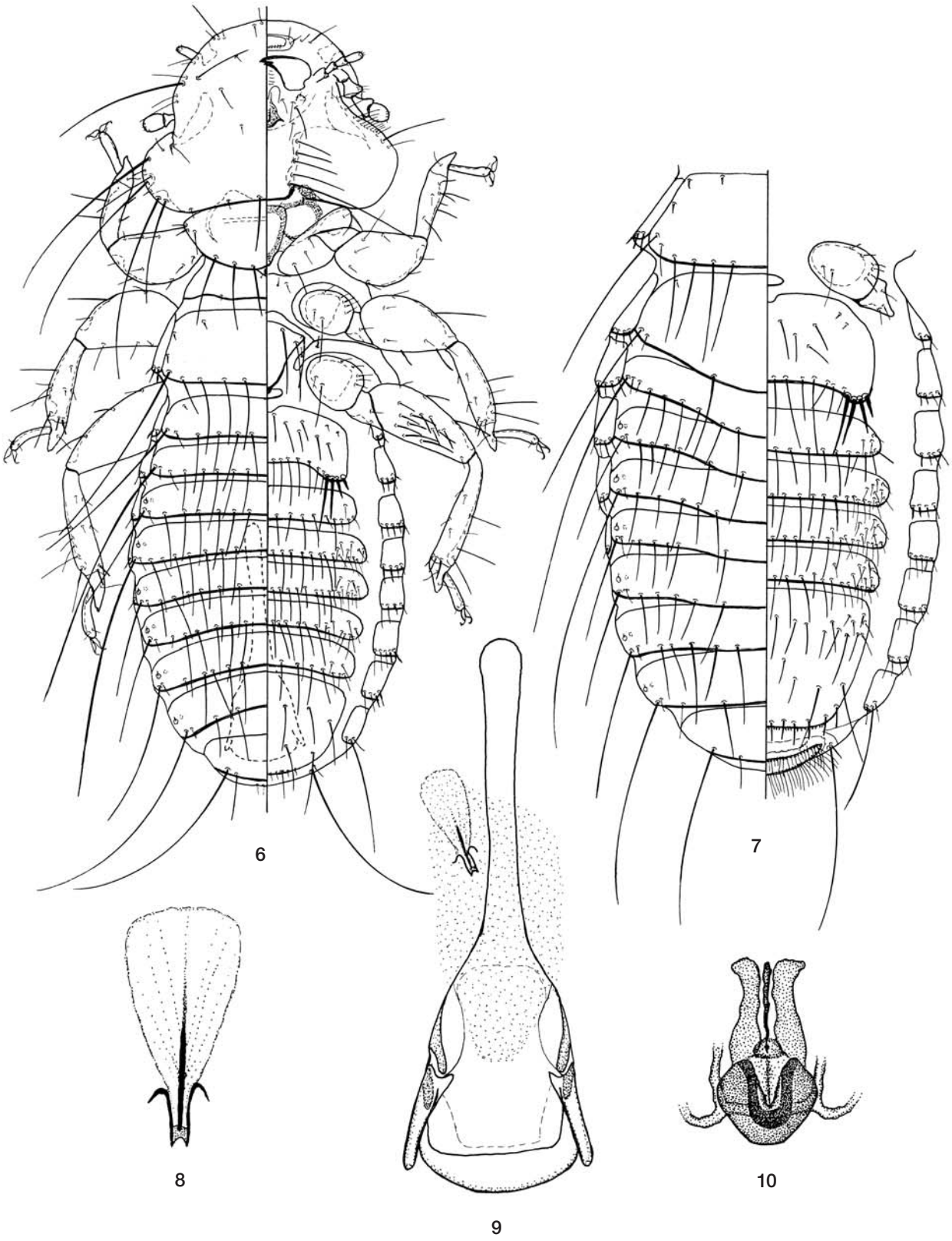
As in Fig. 6. Hypopharyngeal sclerites and gula as in female. Pronotum with 12 marginal setae. Metanotum not enlarged, with 10–12 marginal setae. Metasternal plate with 6–8 setae. Abdomen with all tergites unmodified. Tergal setae: I, 10–16; II, 14–19; III, 16–19; IV, 14–20; V, 12–21; VI, 12–18; VII, 12–16; VIII, 8–11. Postspiracular setae as in female. Sternal setae: sternum I as in female; II, aster as in female, but with 9–15 marginal and 9–17 anterior setae; III, 17–24; IV, 27–38; V, 32–43; VI, 25–39; VII, 13–23; VIII, 6–8. Genitalia as in Fig. 9. Genital sac sclerite as in Fig. 8. Dimensions: TW, 0.43–0.47; HL, 0.30–0.33; PW, 0.27–0.30; PSL, 0.10–0.11; MSL, 0.12–0.15; MW, 0.39–0.42; AWIV, 0.46–0.51; GL, 0.39–0.45; GSL, 0.09–0.11; TL, 1.31–1.43.

MATERIAL EXAMINED:

Type material

Ex *Nesomimus macdonaldi* Ridgway, 1890 – 'Hood Mockingbird'.

Holotype ♀ (MONZ, AI.024729) and 18♂, 17♀ paratypes, Bahía Manzanillo, Isla Española, 24 Apr. 1992, R.L. Palma (MONZ, AI.020325; CDRS). Other paratypes: 1♂, 1♀, Isla Española, 2006, P. Hoeck (MONZ, AI.024711).



Figs 6–10 *Myrsidea nesomimi nesomimi*: 6, dorsoventral view of male; 7, dorsoventral view of female metathorax and abdomen; 8, male genital sac sclerite; 9, male genitalia; 10, female hypopharyngeal sclerites.

Non-types

Ex *Nesomimus macdonaldi* Ridgway, 1890 – 'Hood Mockingbird'.

1♂, Isla Gardner, near Isla Española, [18 May 1899, Snodgrass & Heller coll.], V.L.K. slide 1149 (CISC); 4♂, Isla Gardner, near Isla Española, 12 Jun. 2006, L. Keler (MONZ, AI.024713); 1♂, 1♀, Isla Gardner, near Isla Española, 2006, P. Hoeck (MONZ, AI.024712).

Ex *Nesomimus trifasciatus* (Gould, 1837) – 'Charles Mockingbird'.

15♂, 11♀, Isla Champion, near Isla Floreana, 22 Apr. 1992, R.L. Palma (MONZ, AI.020322; CDRS); 8♂, 5♀, Isla Gardner, near Isla Floreana, 22 Apr. 1992, R.L. Palma (MONZ, AI.020323); 1♂, 1♀, Isla Gardner, near Isla Floreana, 2006, P. Hoeck (MONZ, AI.024714).

Contaminant

Ex *Geospiza conirostris* Ridgway, 1890 – 'Large cactus finch'.

1♂, Bahía Manzanillo, Isla Española, 24 Apr. 1992, R.L. Palma (MONZ, AI.020324).

ETYMOLOGY: The epithet *nesomimi* is an adjective in the genitive case derived from the generic name of the hosts of this louse species.

REMARKS: During the 1992 Galápagos Expedition, 24 mockingbirds belonging to the species *Nesomimus trifasciatus* and *Nesomimus macdonaldi* were searched for lice. *Myrsidea* were found on 19 (79.2 %) of them.

This is the first species of *Myrsidea* recorded from the passerine family Mimidae. No *Myrsidea* species is listed by Price *et al.* (2003: 350) under the Mimidae, and none of the many *Myrsidea* species described since 2003 originated from any host species in that family.

***Myrsidea nesomimi borealis* new subspecies**

'*Menopon incertum*' Kellogg & Kuwana, 1902: 488 (not *Menopon incertum* Kellogg, 1896).

'*Menopon incertum*' Kellogg, 1906: 322 (not *Menopon incertum* Kellogg, 1896).

'*Myrsidea incerta*' Linsley & Usinger, 1966: 128 (not *Menopon incertum* Kellogg, 1896).

Myrsidea sp.; Parker *et al.* 2006: 630.

TYPE HOST: *Nesomimus parvulus* (Gould, 1837) – 'Galápagos Mockingbird'.

DESCRIPTION:

Female

External morphology and hypopharyngeal sclerites as in nominate subspecies. Gula with 5+5 or 5+4 setae, except for a few specimens with 5+6. Pronotum with 12 marginal setae. Metanotum as in nominate subspecies, with 11–14 marginal setae. Metasternal plate with 6–8 setae. Abdomen with tergites as in nominate subspecies. Tergal setae: I, 6; II–IV, 13–19; V–VI, 13–17; VII, 12–16; VIII, 8–11. Postspiracular setae as in nominate subspecies. Sternal setae: sternum I as in nominate subspecies; II, aster as in nominate subspecies, but with 14–17 marginal and 10–19 anterior setae; III, 20–27; IV, 30–40; V, 33–44; VI, 28–37; VII, 16–22; VIII–IX of subgenital plate, 17–25. Anus with 34–46 dorsal fringe setae and 29–40 ventral setae. Dimensions: TW, 0.46–0.50; HL, 0.32–0.35; PW, 0.28–0.31; PSL, 0.11–0.12; MSL, 0.15–0.17; MW, 0.47–0.53; AWIV, 0.61–0.67; ANW, 0.21–0.23; TL, 1.53–1.68.

Male

External morphology, hypopharyngeal sclerites and gula as in nominate subspecies. Pronotum with 12 marginal setae. Metanotum not enlarged, with 8–12 marginal setae. Metasternal plate with 5–8 setae. Abdomen as in nominate subspecies. Tergal setae: I, 10–14; II, 12–19; III, 14–19; IV, 14–18; V, 13–17; VI, 12–18; VII, 11–14; VIII, 8–10. Postspiracular setae as in nominate subspecies. Sternal setae: sternum I as in nominate subspecies; II, aster as in nominate subspecies, but with 10–16 marginal and 11–15 anterior setae; III, 14–25; IV, 22–33; V, 26–37; VI, 20–33; VII, 9–21; VIII, 3–7. Genitalia and genital sac sclerite as in nominate subspecies. Dimensions: TW, 0.41–0.46; HL, 0.30–0.33; PW, 0.27–0.29; PSL, 0.10–0.11; MSL, 0.12–0.14; MW, 0.37–0.42; AWIV, 0.46–0.51; GL, 0.39–0.47; GSL, 0.08–0.11; TL, 1.18–1.41.

MATERIAL EXAMINED:

Type material

Ex *Nesomimus parvulus* (Gould, 1837) – 'Galápagos Mockingbird'.

Holotype ♀ (MONZ, AI.024728) and 4♂, 1♀ paratypes, Punta Espejo, Isla Marchena, 11 Mar. 1992, R.L. Palma (MONZ, AI.020311). Other paratypes: 11♂, 9♀, Playa Ibbetson, Isla Pinta, 13 Mar. 1992, R.L. Palma & E. Vilema (MONZ, AI.020312); 4♂, 7♀, Isla Pinta (50 m a.s.l.), 14 Mar. 1992, R.L. Palma & E.M. Inca (MONZ, AI.020313); 1♂, Isla Pinta (200 m a.s.l.), 17 Mar. 1992, R.L. Palma (MONZ, AI.020314); 1♂, 2♀, Playa Negra, Isla Marchena, 24 Mar. 1992, R.L. Palma & E. Vilema (MONZ, AI.020315); 2♂, 3♀, Playa Espumilla, Isla Santiago, 13 Apr. 1992, R.L. Palma (MONZ, AI.020319); 3♂, 1♀, Isla Rábida, 18 Mar. 2006, P. Hoeck (MONZ, AI.024715).

Non-types

Ex *Nesomimus parvulus* (Gould, 1837) – 'Galápagos Mockingbird'.

2♀, Albermale Island (= Isla Isabela), [29 Dec. 1898, Snodgrass & Heller coll.], V.L.K. slides 996, 998a (CISC); 1♀, Narborough Island (= Isla Fernandina), [6 Jan. 1899, Snodgrass & Heller coll.], V.L.K. slide 1139 (CISC); 1♂, Barrington Island (= Isla Santa Fe), [29 May 1899, Snodgrass & Heller coll.], V.L.K. slide 1133d (CISC); 3♂, 1♀, Bahía Darwin, Isla Genovesa, 10 Mar. 1992, R.L. Palma & E. Vilema (MONZ, AI.020310); 4♂, 3♀, Isla Santa Cruz, 4–9 Jul. 2003, J.L. Bollmer (MONZ, AI.020318); 2♂, 3♀, Isla Fernandina, 10 Jul. 2003, N.K. Whiteman (MONZ, AI.020320); 4♂, 4♀, Villamil, Isla Isabela, 18–26 Feb. 2004, J.L. Bollmer (MONZ, AI.020317); 2♂, 2♀, Isla Fernandina, 6 Jul. 2004, N.K. Whiteman (MONZ, AI.020321); 6♂, 6♀, Isla Genovesa, 15–16 Jul. 2004, J.L. Bollmer (MONZ, AI.020316); 2♂, Isla Santa Fe, 2006, P. Hoeck (MONZ, AI.024717); 2♀, Isla Santa Cruz, 2006, P. Hoeck (MONZ, AI.024716); 1♂, Indefatigable Island (= Isla Santa Cruz), no date, R. Beck 117, slide 1362a (CISC).

Ex *Nesomimus melanotis* (Gould, 1837) – 'Chatham Mockingbird'.

1♀, Chatham Island (= Isla San Cristóbal), [23 May 1899, Snodgrass & Heller coll.], V.L.K. slide 1142 (CISC. The host name given on this slide is '*Nesomimus macdonaldi*', but the bird skin from which the louse was collected is held at the California Academy of Sciences (CAS ORN 78583) and has been identified as an adult male of *Nesomimus melanotis*); 1♂, 1♀, Isla San Cristóbal, 2006, P. Hoeck (MONZ, AI.024718); 2♂, 2♀, Isla San Cristóbal, 21 Feb. 2008, P. Hoeck (MONZ, AI.024719); 2♀, James Island [error?] (= Isla Santiago), no date, R. Beck 122, slide 1373b (CISC).

Stragglers and contaminants

Ex *Geospiza conirostris* Ridgway, 1890 – 'Large cactus finch'.

1♀, Hood Island (= Isla Española), [19 May 1899, Snodgrass & Heller coll.], V.L.K. slide 980 (CISC).

Ex *Geospiza fuliginosa* Gould, 1837 – 'Small ground finch'.

1♀, Albermale Island (= Isla Isabela), [9 Jan. 1899, Snodgrass & Heller coll.], V.L.K. slide 1077b (CISC); 1♀, Albermale Island (= Isla Isabela), [22 Jan. 1899, Snodgrass & Heller coll.], V.L.K. slide 1094a (CISC); 1♂, Narborough Island (= Isla Fernandina), [27 Jan. 1899, Snodgrass & Heller coll.], V.L.K. slide 1021a (CISC).

Ex *Geospiza fortis* Gould, 1837 – 'Medium ground finch'.

1♀, Albermale Island (= Isla Isabela), [29 Jan. 1899, Snodgrass & Heller coll.], V.L.K. slide 1024a (CISC).

Ex *Geospiza* sp.

1♂, Chatham Island (= Isla San Cristóbal), [24 May 1899, Snodgrass & Heller coll.], V.L.K. slide 1098 (CISC).

Ex *Camarhynchus heliobates* (Snodgrass & Heller, 1901) 'Mangrove finch'.

1♀, Albermale Island (= Isla Isabela), [24 Jan. 1899, Snodgrass & Heller coll.], V.L.K. slide 1122b (CISC. The host name given on this slide is '*Camarhynchus productus*', but the bird from which the louse was collected is now included in the type series of *Camarhynchus heliobates*).

Ex *Camarhynchus crassirostris* Gould, 1837 – 'Vegetarian finch'.

1♀, Chatham Island (= Isla San Cristóbal), [23 May 1899, Snodgrass & Heller coll.], V.L.K. slide 1002 (CISC).

Ex *Certhidea olivacea* Gould, 1837 – 'Warbler finch'.

1♂, Wenman Island (= Isla Wolf), [Dec. 1898, Snodgrass & Heller coll.], V.L.K. slide 982b (CISC).

Ex *Pyrocephalus rubinus* (Boddaert, 1783) – 'Vermillion flycatcher'.

1♀, Albermale Island (= Isla Isabela), [29 Dec. 1898, Snodgrass & Heller coll.], V.L.K. slide 999 (CISC).

Ex *Progne modesta* Gould, 1838 – 'Galápagos martin'.

1♂, Albermale Island (= Isla Isabela), [29 Jan. 1899, Snodgrass & Heller coll.], V.L.K. slide 1105b (CISC); 1♀, Indefatigable Island (= Isla Santa Cruz), no date, R. Beck 115, slide 1374 (CISC).

Ex *Oceanites gracilis* (Elliot, 1859) – 'White-vented storm petrel'.

1♂, Albermale Island (= Isla Isabela), [28 Dec. 1898, Snodgrass & Heller coll.], V.L.K. slide 1113a (CISC).

Ex *Actitis macularius* (Linnaeus, 1766) – 'Spotted sandpiper'.

2♀, Albermale Island (= Isla Isabela), [24 Jan. 1899, Snodgrass & Heller coll.], V.L.K. slides 1108b, 1108d (CISC).

Ex *Sterna fuscata* (Linnaeus, 1766) – 'Sooty tern'.

1♀, Bindloe Island (= Isla Marchena), no date, R. Beck 181, slide 1392c (CISC).

ETYMOLOGY: The epithet *borealis* is a noun in apposition referring to the northern distribution of the two host species of this louse subspecies.

REMARKS: During the 1992 Galápagos Expedition, 12 mockingbirds of the species *Nesomimus parvulus* were searched for lice. *Myrsidea* were found on 11 (91.7 %) of them. Subsequent collecting efforts by Paquita Hoeck resulted in two *Myrsidea* samples from *Nesomimus melanotis* (see above).

The hosts of the two subspecies of *Myrsidea nesomimi* show an allopatric geographical distribution, in agreement with the definition of the subspecies concept:

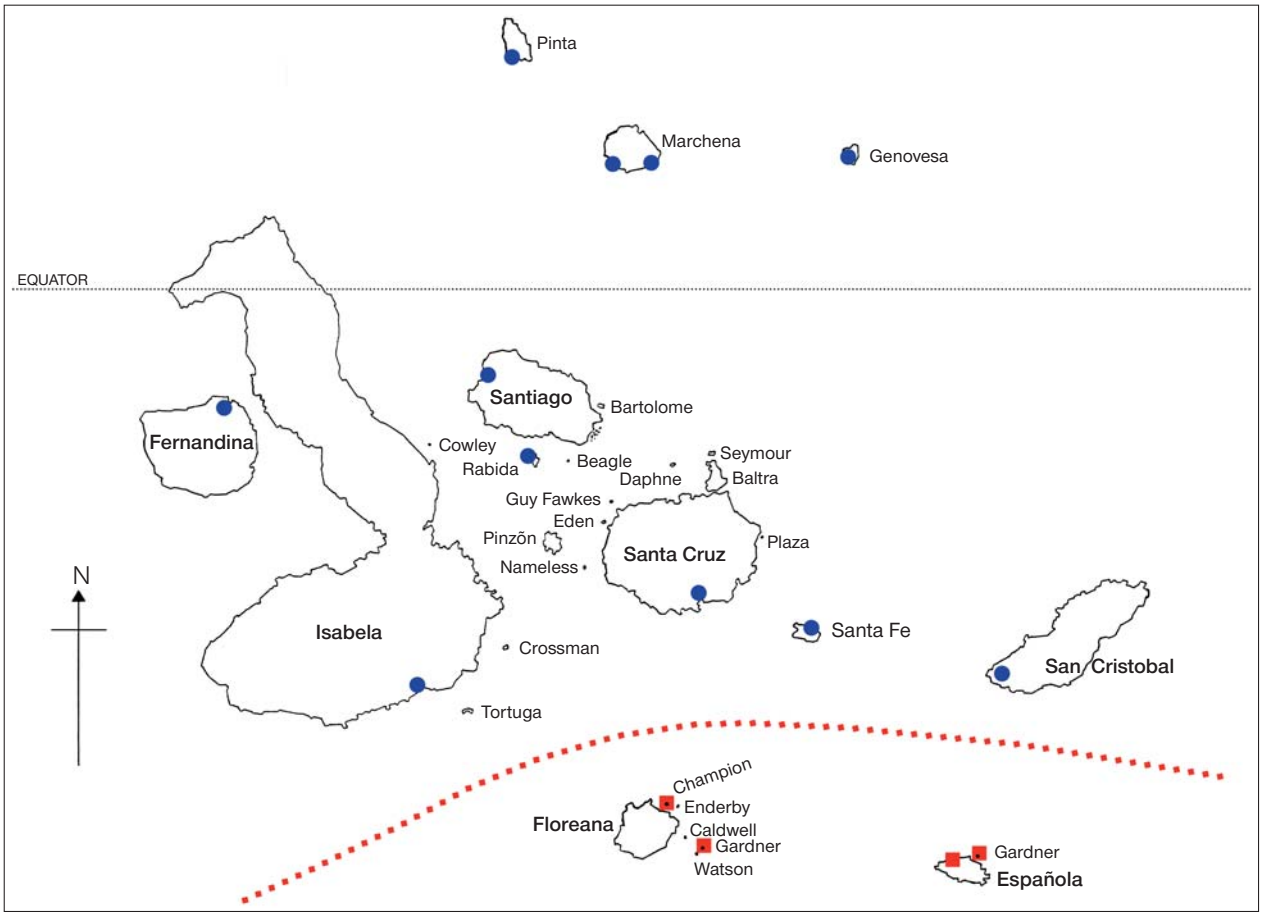


Fig. 11 Map of the Galápagos Islands showing distribution of *Myrsidea nesomimi*, excluding stragglers and contaminants. Red squares indicate records of *Myrsidea nesomimi nesomimi*; blue circles indicate records of *Myrsidea nesomimi borealis*. The two northernmost islands, Darwin and Wolf, have been omitted.

Nesomimus macdonaldi and *Nesomimus trifasciatus*, hosts of *M. n. nesomimi*, are restricted to the southernmost islands in the archipelago, i.e. *N. macdonaldi* on Española (= Hood Island), and on Gardner near Española; and *N. trifasciatus* on two small islands (Champion and Gardner) situated near Floreana (= Charles Island). The second subspecies, *M. n. borealis*, parasitises the two northern mockingbird species, i.e. *Nesomimus melanotis* on San Cristóbal (= Chatham Island); and *Nesomimus parvulus* on eight islands – Fernandina (= Narborough Island), Isabela (= Albemarle Island), Santiago (= James Island), Santa Cruz (= Indefatigable Island), Santa Fe (= Barrington Island), Rábida (= Jervis Island), Genovesa (= Tower Island), Marchena (= Bindloe Island), and Pinta (= Abingdon Island) (Fig. 11).

Myrsidea nesomimi nesomimi is larger than *M. n. borealis* in most average dimensions. Furthermore, both sexes of the nominate subspecies have consistently higher numbers of sternal setae, as shown in the average values listed in Table 1. We believe that the morphological differences between these two populations, as well as their allopatric geographical distribution, justify the naming of them as separate subspecies.

A multivariate study of morphological variation among Galápagos mockingbirds by Abbott & Abbott (1978) concluded that the most distinctive populations of mockingbirds were those from the southern islands of Española (*Nesomimus macdonaldi*) and Champion and Gardner near Floreana (*Nesomimus trifasciatus*), a result that supports our separation of the two populations of *Myrsidea nesomimi* into distinct taxa.

However, a molecular phylogeny of Galápagos mockingbirds and other species of Mimidae from North and South America by Arbogast *et al.* (2006) reached different and unexpected conclusions, which agree neither with the current morphologically based taxonomy of Galápagos

Table 1 Average numbers of sternal setae in the subspecies of *Myrsidea nesomimi*.

	Myrsidea nesomimi nesomimi				*Myrsidea nesomimi borealis*			
	♀♀		♂♂		♀♀		♂♂	
Sternal segments	Number of lice	Average number of setae	Number of lice	Average number of setae	Number of lice	Average number of setae	Number of lice	Average number of setae
III	20	27.6	20	20.7	19	22.8	20	19.1
IV	20	42.2	21	32.2	19	33.9	20	27.5
V	18	45.9	20	35.9	18	37.5	19	30.3
VI	19	40.2	21	31.6	18	33.3	20	27.1
VII	17	24.2	21	18.8	18	18.6	20	15.8
VIII ♂	—	—	21	7.0	—	—	20	5.4
Subgenital plate ♀	16	22.9	—	—	17	20.4	—	—

mockingbirds, nor with our taxonomic separation of the *Myrsidea* populations from *Nesomimus*. The Arbogast *et al.* (2006) study shows that *Nesomimus macdonaldi* is more closely related to *Nesomimus melanotis* than to *Nesomimus trifasciatus*. Also, they found that, among the seven island populations of *Nesomimus parvulus* analysed, six are monophyletic but one (from Isla Genovesa) is nested within the *N. macdonaldi*/*N. melanotis* clade.

***Myrsidea ridulosa* (Kellogg & Chapman, 1899)**
(Figs 12–16)

Menopon ridulosum Kellogg & Chapman, 1899: 135, pl. 9, fig. 4.

Myrsidea ridulosa (Kellogg & Chapman, 1899); Price *et al.* 2003: 131.

TYPE HOST: *Dendroica petechia* (Linnaeus, 1766) – 'Yellow warbler'.

DESCRIPTION:

Female

Metathorax and abdomen as in Fig. 13. Hypopharyngeal sclerites well developed, as in Fig. 16. Gula with 5+5 setae. Pronotum with 12 marginal setae. Metanotum not enlarged, with 11–13 marginal setae. Metasternal plate with 5–6 setae. Abdomen with all tergites unmodified. Tergal setae: I, 15–16; II–III, 15–18; IV, 16–17; V, 13–16; VI, 9–10; VII, 8–9; VIII, 8. Postspiracular setae extremely long on II and IV, very long on I and VIII, shortest on III and V–VII. Sternal setae: sternum I very small without setae; II, aster with 4+4 setae, also with 12–14 marginal and 9–11 anterior setae; III, 19–27; IV, 31–36; V, 35–41; VI, 28–33; VII, 9–11; VIII–IX of subgenital plate, 17–20. Anus with 32–35 dorsal fringe setae and 33–37 ventral setae. Dimensions: TW, 0.40–0.43; HL, 0.30–0.32; PW, 0.27; PSL, 0.09–0.10; MSL, 0.14–0.15; MW, 0.40–0.45; AWIV, 0.53–0.61; ANW, 0.17–0.19; TL, 1.35–1.45.

Male

As in Fig. 12. Hypopharyngeal sclerites as in female. Gula with 4+4 or 5+5 setae. Pronotum with 12 marginal setae. Metanotum not enlarged, with 6–9 marginal setae. Metasternal plate with 4–5 setae. Abdomen with all tergites unmodified. Tergal setae: I, 9–11; II, 10–12; III, 12–13; IV, 12; V, 10; VI, 9–10; VII–VIII, 8. Postspiracular setae extremely long on II and IV, very long on VIII, long on I and VII, shortest on III and V–VI. Sternal setae: sternum I as in female; II, aster with 3+3 setae, also with 9 marginal and 8 anterior setae; III, 18; IV, 24–26; V, 29–30; VI, 22–23; VII, 8–11; VIII, 4. Genitalia as in Fig. 15. Genital sac sclerite as in Fig. 14. Dimensions: TW, 0.37–0.39; HL, 0.29–0.30; PW, 0.25; PSL, 0.09; MSL, 0.12; MW, 0.36; AWIV, 0.43–0.44; GL, 0.38–0.40; GSL, 0.7–0.8; TL, 1.17–1.19.

MATERIAL EXAMINED:

Ex *Dendroica petechia aureola* (Gould, 1839) – 'Galápagos yellow warbler'.

1♀, Charles Darwin Research Station, Isla Santa Cruz, 5 Mar.

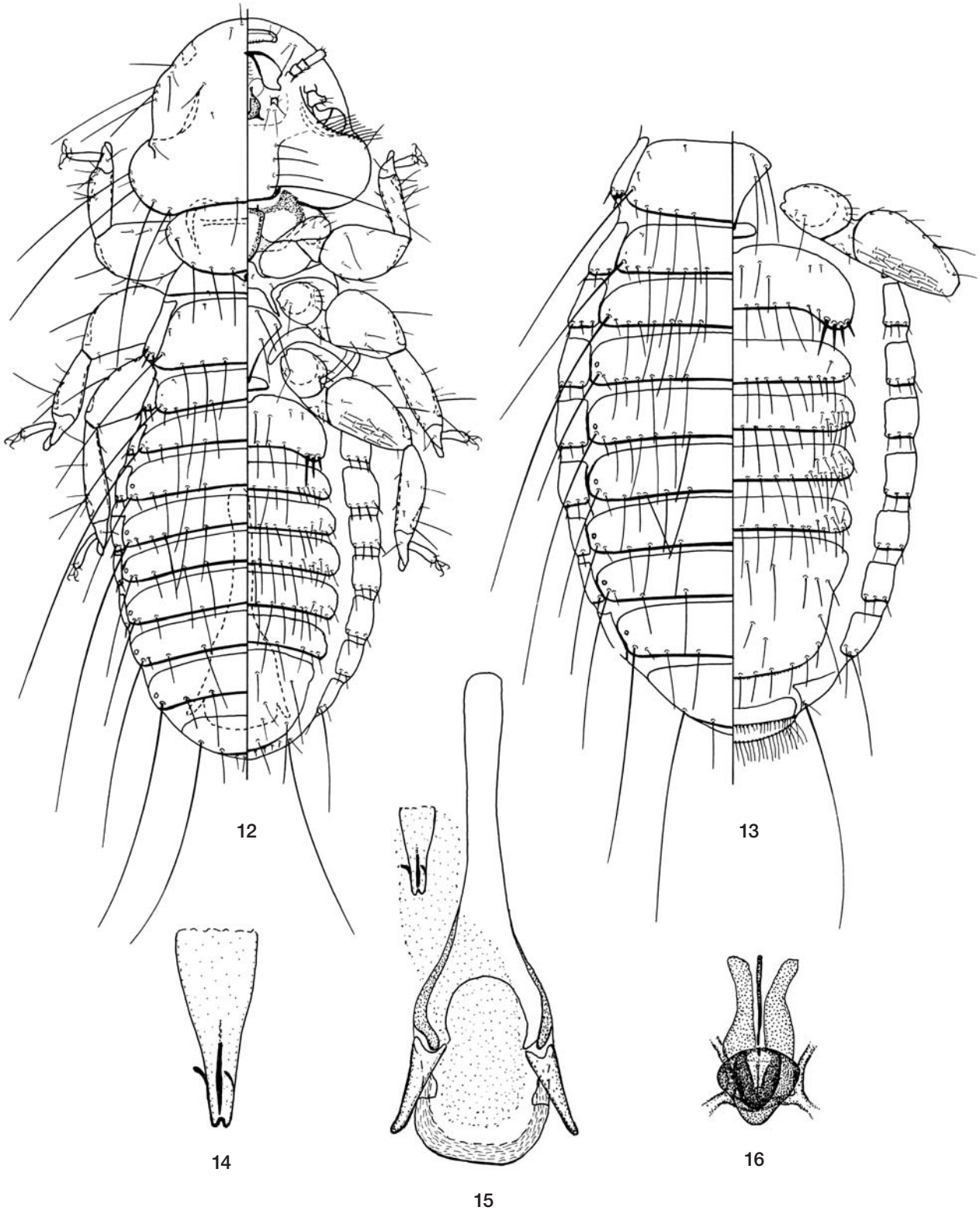


Fig. 12–16 *Myrsidea ridulosa*: 12, dorsoventral view of male; 13, dorsoventral view of female metathorax and abdomen; 14, male genital sac sclerite; 15, male genitalia; 16, female hypopharyngeal sclerites.

1992, R.L. Palma & E.M. Inca (MONZ, AI.020326); 2♀, 9 nymphs, Bellavista, Isla Santa Cruz, 1 Apr. 1992, R.L. Palma & E. Vilema (MONZ, AI.020327).

Stragglers and contaminants

Ex *Camarhynchus pallidus* (Sclater & Salvin, 1870) 'Woodpecker finch'.

1♂, Bellavista, Isla Santa Cruz, 1 Apr. 1992, R.L. Palma & E. Vilema (MONZ, AI.020328) [CONTAMINANT from *Dendroica petechia aureola*].

Ex *Camarhynchus pauper* Ridgway, 1890 'Medium tree finch'.

1♂, Isla Floreana, 1971, M.P. Harris (MONZ, AI.020329) [STRAGGLER or CONTAMINANT from *Dendroica petechia aureola*].

REMARKS: Both sexes of *Myrsidea ridulosa* can be separated from those of *Myrsidea darwini* by their well-developed hypopharyngeal sclerites; females can be further separated by having more metanotal and marginal tergal setae, and males by the shape of the heads. *Myrsidea ridulosa* can be separated from *Myrsidea nesomimi* by females not having enlarged or modified tergites, and by males having fewer metanotal and marginal tergal setae.

This is the only species of *Myrsidea* recorded from members of the passerine family Parulidae (see Price *et al.* 2003: 352), and it is here recorded for the first time from the Galápagos Islands. We are confident that the two males listed above as stragglers or contaminants from *Dendroica petechia aureola* belong to *Myrsidea ridulosa* because (1) they are different from males of *Myrsidea darwini*, the species found on Darwin's finches; and (2) the specimen recorded from *Camarhynchus pallidus* was collected immediately after the sample of *M. ridulosa* from *D. p. aureola*, by the same collectors and in the same place. The other male, from *Camarhynchus pauper*, was found on a dead bird preserved in alcohol in the museum of the Charles Darwin Research Station, and it is possible that it had been stored in the same container along with a yellow warbler.

Discussion

The four *Myrsidea* taxa described in this paper differ from *Myrsidea incerta* (Kellogg, 1896) – the species that Kellogg & Kuwana (1902: 488) and Kellogg (1906: 322) identified their samples of *Myrsidea* from the Galápagos Islands – by several features. In the female, the metanotum of *M. incerta* is enlarged and the posterior margins of the first four abdominal terga are slightly convex (see Clay 1966: 350, fig. 30), while in the taxa described above the metanota are not enlarged, and the posterior margins of the first four abdominal terga are either concave (Figs 2, 13) or much more convex, with the first segment enlarged (Fig. 7). Males of *M. incerta* can easily be distinguished from males of the *Myrsidea* taxa described above by the shape of the male genital sac sclerite: compare fig. 66 in Clay (1966: 387) against Figs 3, 8, and 14 in this paper.

Kellogg (1906: 322) identified a female louse from *Progne modesta* (ex Indefatigable Island = Isla Santa Cruz) as '*Menopon rusticum* Giebel, 1874'. Although that louse species is now known as *Myrsidea rustica* (Giebel, 1874), the specimen that Kellogg identified (CISC, slide 1378a, Beck 113) is a female of *Colpocephalum heterosoma* Piaget, 1880 – a species parasitic on flamingos (Price *et al.* 2003: 99, 300) – as identified by Theresa Clay (*in* Linsley & Usinger 1966: 128).

Acknowledgements

We are grateful to Cheryl B. Barr (Essig Museum, Berkeley, California, USA) for the loan of specimens from the Kellogg collection, to Noah K. Whiteman (University of Missouri, St Louis, Missouri, USA) for donating specimens collected by him and J.L. Bollmer, and to Vincent S. Smith (Natural History Museum, London, UK) for donating specimens collected by Paquita Hoeck in the Galápagos Islands. We thank the authorities of the Galápagos National Park Service and the Charles Darwin Research Station (Isla Santa Cruz, Galápagos Islands, Ecuador) for their assistance in facilitating fieldwork in the Galápagos Islands. We are indebted to Stewart B. Peck (Carleton University, Ottawa, Canada) and the '*Grupo Peck*', especially Eduardo Vilema (Puerto Ayora, Galápagos Islands, Ecuador), for their most valuable assistance in collecting louse samples from live birds during the 1992 Galápagos Expedition. We thank the late Robert C. Dalgleish (San Diego, California, USA) for providing additional data for Kellogg Collection specimens, and for his review of the manuscript. Also, our thanks go to Vincent S. Smith (Natural History Museum, London, UK) for useful comments on the manuscript.

References

Abbott, I. and Abbott, L.K. (1978). Multivariate study of morphological variation in Galápagos and Ecuadorean mockingbirds. *Condor* 80: 302–308.

Arbogast, B.S., Drovetski, S.V., Curry, R.L., Boag, P.T., Seutin, G., Grant, P.R., Grant, B.R. and Anderson, D.J. (2006). The origin and diversification of Galapagos mockingbirds. *Evolution* 60: 370–382.

Clay, T. (1966). Contributions towards a revision of *Myrsidea* Waterston. I. (Menoponidae: Mallophaga). *Bulletin of the British Museum (Natural History), Entomology* 17(8): 327–395.

Dalgleish, R.C. and Price, R.D. (2003). Two new species of *Myrsidea* (Phthiraptera: Amblycera: Menoponidae) from hummingbirds (Apodiformes: Trochilidae). *Occasional Papers of the Western Foundation of Vertebrate Zoology* 6: 1–9.

Dalgleish, R.C. and Price, R.D. (2004). Four new species of *Myrsidea* (Phthiraptera: Menoponidae) from manakins (Passeriformes: Pipridae). *Journal of the New York Entomological Society* 111(4): 167–173.

Dalgleish, R.C. and Price, R.D. (2005). Two new species of the genus *Myrsidea* Waterston (Phthiraptera: Menoponidae) from cotingas (Passeriformes: Cotingidae). *Zootaxa* 983: 1–6.

Dickinson, E.C. (2003). *The Howard and Moore complete checklist of the birds of the world.* 3rd edn. Princeton, NJ: Princeton University Press. 1039 pp.

Hellenthal, R.A. and Price, R.D. (2003). The genus *Myrsidea* Waterston (Phthiraptera: Menoponidae) from bulbuls (Passeriformes: Pycnonotidae), with descriptions of 16 new species. *Zootaxa* 354: 1–20.

Hellenthal, R.A. and Price, R.D. (2005). Two new species of *Myrsidea* Waterston (Phthiraptera: Amblycera: Menoponidae) from the jewel-babblers (Passeriformes: Eupetidae) from New Guinea. *Proceedings of the Entomological Society of Washington* 107(3): 485–488.

Johnson, K.P. and Price, R.D. (2006). Five new species of *Myrsidea* Waterston (Phthiraptera: Menoponidae) from bristlebills and greenbuls (Passeriformes: Pycnonotidae) in Ghana. *Zootaxa* 1177: 27–37.

Kellogg, V.L. (1896). New Mallophaga, II, – from landbirds; together with an account of the mallophagous mouth-parts. *Proceedings of the California Academy of Sciences (series 2)* 6: 431–548, pls 60–73.

Kellogg, V.L. (1906). A second collection of Mallophaga from birds of the Galapagos and Revillagigedo Islands and neighboring waters. *Transactions of the American Entomological Society* 32: 315–324.

Kellogg, V.L. and Chapman, B.L. (1899). New Mallophaga, III. Mallophaga from birds of California. *Occasional Papers of the California Academy of Sciences* 6: 53–143, pls 5–9.

Kellogg, V.L. and Kuwana, S.I. (1902). Papers from the Hopkins Stanford Galapagos Expedition, 1898–1899. X. Entomological results (8). Mallophaga from birds. *Proceedings of the Washington Academy of Sciences* 4: 457–499, pls 28–31.

Klockenhoff, H.F. (1984). A redescription of *Myrsidea serini* (Mallophaga: Menoponidae), a parasite from passerine birds. *New Zealand Journal of Zoology* 11(1): 17–22.

Linsley, E.G. and Usinger, R.L. (1966). Insects of the Galápagos Islands. *Proceedings of the California Academy of Sciences (4th series)* 33(7): 113–196.

Palma, R.L. (1978). Slide-mounting of lice: a detailed description of the Canada balsam technique. *New Zealand Entomologist* 6: 432–436.

Palma, R.L. (1994). The identity of *Nirmus obtusus* and other *Quadraceps* species (Phthiraptera: Philopteridae) from Clipperton Island and the Galápagos Islands. *Journal of the Royal Society of New Zealand* 24(3): 267–276.

Parker, P.G., Whiteman, N.K. and Miller, R.E. (2006). Conservation medicine on the Galápagos Islands: partnerships among behavioral, population, and veterinary scientists. *The Auk* 123(3): 625–638.

Price, R.D. and Dalgleish, R.C. (2006). *Myrsidea* Waterston (Phthiraptera: Menoponidae) from tanagers (Passeriformes: Thraupidae), with descriptions of 18 new species. *Zootaxa* 1174: 1–25.

Price, R.D. and Dalgleish, R.C. (2007). *Myrsidea* Waterston (Phthiraptera: Menoponidae) from the Emberizidae (Passeriformes), with descriptions of 13 new species. *Zootaxa* 1467: 1–18.

Price, R.D., Hellenthal, R.A and Dalgleish, R.C. (2005). The genus *Myrsidea* Waterston (Phthiraptera: Menoponidae) from tyrant-flycatchers (Passeriformes: Tyrannidae), with descriptions of 13 new species. *Zootaxa* 1048: 1–20.

Price, R.D., Hellenthal, R.A. and Palma, R.L. (2003). World checklist of chewing lice with host associations and keys to families and genera. Pp. 1–448. *In*: Price, R.D., Hellenthal, R.A., Palma, R.L., Johnson, K.P. and Clayton, D.H. The chewing lice: world checklist and biological overview. *Illinois Natural History Survey Special Publication* 24: i–x + 1–501.

Price, R.D., Hellenthal, R.A. and Weckstein, J.D. (2004). The genus *Myrsidea* Waterston (Phthiraptera: Menoponidae) from the toucans (Piciformes: Ramphastidae), with descriptions of three new species. *Zootaxa* 613: 1–18.

Price, R.D. and Johnson, K.P. (2006a). Four new species of *Myrsidea* Waterston (Phthiraptera: Menoponidae) from the Malagasy warblers (Passeriformes). *Zootaxa* 1297: 47–55.

Price, R.D. and Johnson, K.P. (2006b). *Myrsidea willardi* Price and Johnson, a new species of chewing louse (Phthiraptera: Menoponidae) from Schlegel's asity (Passeriformes: Philepittidae). *Journal of the Kansas Entomological Society* 79(3): 267–271.

Séguy, E. (1944). Insectes ectoparasites (Mallophages, Anoploures, Siphonaptères). *Faune de France* 43: 1–684. [Kraus Reprint, Nendeln, Liechtenstein, 1970].

Sychra, O., Literák, I., Čapek, M. and Havlíček, M. (2006). Chewing lice (Phthiraptera) from typical antbirds and ground antbirds (Passeriformes: Thamnophilidae, Formicariidae) from Costa Rica, with descriptions of three new species of the genera *Formicaphagus* and *Myrsidea*. *Zootaxa* 1206: 47–61.

Waterston, J. (1915). On two new species of Mallophaga (Menoponidae): *Menacanthus balfouri* n.sp. and *Myrsidea victrix* n.sp. from Colombia. *Entomologist's Monthly Magazine* 51: 12–16.