Descriptions of six new species of slender-bodied chewing lice of the Resartor-group (Phthiraptera: Ischnocera: Brueelia-complex)

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Abstract

Six new species of chewing lice in the Resartor-group (Brueelia-complex) are described and illustrated. They are: Aratricerca cerata n. sp. ex Zosterops capensis Sundevall, 1850; Aratricerca macki n. sp. ex Melidectes princeps Mayr & Gilliard, 1951 and Ptiloprora perstriata perstriata (de Vis, 1898); Aratricerca madagascariensis n. sp. ex Randia pseudozosteros Delacour & Berloz, 1931; Turdinirmoides janigai n. sp. ex Prunella collaris nipalensis (Blyth, 1843) and P. collaris fennelli Deignan, 1964; Turdinirmoides rozsai n. sp. ex Carpodacus subhimachala (Hodgson, 1836); and Timalinirmus curvus n. sp. ex Tuhina castaniceps plumbeiceps (Godwin-Austen, 1877). A key to the species of Aratricerca, Turdinirmoides and Timalinirmus is provided.

Key words: Phthiraptera, Ischnocera, Brueelia-complex, Resartor-group, Aratricerca, Turdinirmoides, Timalinirmus, new species, chewing lice

Introduction

The Brueelia-complex (sensu Gustafsson & Bush 2017) includes a large number of morphologically similar genera of chewing lice, primarily occurring on perching birds (Passeriformes). The majority of the species in this complex fall into two genera: Brueelia Kéler, 1936 and Guimaraesiella Eichler, 1949, which form the cores of two major radiations within the complex: the Guimaraesiella radiation [clades A–H in the phylogeny of Bush et al. (2016)] and the Brueelia radiation (clades I–K in the same phylogeny). Species of each of these radiations are found across most parts of the world, and each group collectively parasitises a large range of hosts in different families (Gustafsson & Bush 2017).

In addition, Bush et al. (2016; fig. 3f, clades L–M) and Gustafsson & Bush (2017) identified a third radiation of lice in this complex, which is less speciose, more geographically restricted, and more host specific. This radiation is here called the Resartor-group and is primarily characterised morphologically by the structure of the male genitalia, the typically sparse abdominal setae, and (in most genera) the internal thickenings of the dorsal preantennal area. The phylogeny in Bush et al. (2016) included only representatives of four of the genera included in the Resartor-group; here, we consider nine genera and one subgenus as part of this group (Table 1). The genera Hecatrishula Gustafsson & Bush, 2017 and Psammonirmus Gustafsson & Bush, 2017 may also belong to this group, but no genetic data are available for either of these genera, and morphological data are ambiguous. In total, 39 species are known in this group, including the species described here (Table 2).

The host associations of the species included in the Resartor-group follow no clear pattern. Species of several genera of this group are known from only one host family (Table 2), whereas others (e.g. Aratricerca Gustafsson & Bush, 2017) are more widely distributed. However, lice in the Resartor-group are poorly known, with 27 species (69.2%) described in the last decade, underlining how little we know of the group. This lack of knowledge also ap-
plies to the host families of the lice in the Resartor-group. For instance, almost all species of Resartor Gustafsson & Bush, 2017 were known from hosts in the Leiothrichidae, but Gustafsson et al. (2018) described the first species of this genus from a host in the Sylviidae. Similarly, species of Maculinirmus Złotorzycka, 1964 were mainly known from hosts in the Oriolidae, but Bush et al. (2016), Gustafsson & Bush (2017) and Mey (2017) reported specimens belonging to this genus from hosts in the Cinclosomatidae. It would appear that most of the genera in the Resartor-group have wider host ranges than presently known, but our understanding of both the diversity of this louse group and its hosts is hampered by the lack of knowledge of chewing lice from passeriform hosts in the tropics.

As a case in point, in this paper we describe six new species belonging to the Resartor-group, of which four are new host-family records for the respective genera: Aratricerca and Timalinirmus from Zosteropidae, Aratricerca from Bernieridae, and Turdinirmoides from Prunellidae.

**TABLE 1. Genera and subgenera of chewing lice in the Resartor group (Ischnocera: Brueelia-complex).**

Includes species described here, by Mey (2017) and by Gustafsson et al. (2018, 2021), as well as distribution notes from Gustafsson & Bush (2017). Gustafsson & Bush (2017) mentioned a number of specimens of Turdinirmoides from other host families, but they are either only females or poorly preserved specimens; therefore, they are not included here.

<table>
<thead>
<tr>
<th>Genus (subgenus)</th>
<th>Host distribution</th>
<th>Geographical range</th>
<th>Number of species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aratricerca</td>
<td>Gustafsson &amp; Bush, 2017</td>
<td>Bernieridae, Meliphagidae, Zosteropidae</td>
<td>Afrotropical, Australo-Papuan</td>
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<tr>
<td>Ceratocista</td>
<td>Gustafsson &amp; Bush, 2017</td>
<td>Timaliidae</td>
<td>Indo-Malayan</td>
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<tr>
<td>Indoceoplanetes</td>
<td>Gustafsson &amp; Bush, 2017</td>
<td>Campephagidae</td>
<td>Afrotropical, Australo-Papuan, Indo-Malayan</td>
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<tr>
<td>Indoceoplanetes</td>
<td>Gustafsson &amp; Bush, 2017</td>
<td>Campephagidae</td>
<td>Australo-Papuan, Indo-Malayan</td>
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<td>Maculinirmus</td>
<td>Złotorzycka, 1964</td>
<td>Oriolidae</td>
<td>Indo-Malayan, Palearctic</td>
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<tr>
<td>Resartor</td>
<td>Gustafsson &amp; Bush, 2017</td>
<td>Leiothrichidae, Paradoxornithidae</td>
<td>Indo-Malayan</td>
</tr>
<tr>
<td>Timalinirmus</td>
<td>Mey, 2017</td>
<td>Timaliidae, Zosteropidae</td>
<td>Indo-Malayan</td>
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<td>Titanomessor</td>
<td>Gustafsson &amp; Bush, 2017</td>
<td>Malacoitidae</td>
<td>Afrotropical</td>
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<td>Turdinirmoides</td>
<td>Gustafsson &amp; Bush, 2017</td>
<td>Fringillidae, Muscicapidae, Prunellidae</td>
<td>Indo-Malayan</td>
</tr>
<tr>
<td>Turdinirmus</td>
<td>Eichler, 1951</td>
<td>Turdidae</td>
<td>Palearctic, Indo-Malayan, Australo-Papuan</td>
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</tbody>
</table>

**Material and methods**

Holotypes and paratypes of the new species described here are deposited at the Natural History Museum, London, United Kingdom (NHML); the Slovenian Museum of Natural History, Ljubljana, Slovenia (PMSL); the Field Museum of Natural History, Chicago, U.S.A. (FMNH); the Price Institute for Parasite Research, University of Utah, Salt Lake City, U.S.A. (PIPR); the Bernice Pauahi Bishop Museum, Honolulu, Hawaii, U.S.A. (BPBM); and the Institute of Zoology, Guangdong Academy of Sciences (IZGAS). All material examined was mounted in Canada balsam on microscope slides. Specimens were examined and measured with a Nikon Eclipse E600 fitted with an Olympus DP25 camera and digital measuring software (ImageJ, 1.48v, Wayne Rasband), or from live images in NIS-Elements (Nikon Corporation, Tokyo, Japan). Illustrations were prepared using a drawing tube fitted to a Nikon Eclipse E600 or a Nikon Eclipse Ni microscope, and edited in GIMP (www.gimp.org), from specimens from type hosts unless otherwise noted. Host taxonomy follows Clements et al. (2019).

Terminology of chaetotaxy, structural and genital characters, and abbreviations thereof, follow Gustafsson and Bush (2017) and Gustafsson et al. (2019a). These include: ads = anterior dorsal setae; gpmes = gonoporal poste-
rior mesosomal setae; lpmes = lateral posterior mesosomal setae; ps = paratergal setae; pst1–2 = parameral setae 1–2; ss = sutural setae; sts = sternal setae; tsp = tergal posterior setae; vms = vulval marginal setae; vos = vulval oblique setae; vss = vulval submarginal setae. These setae are indicated in Figs 1, 3, 5–7, 24, 32, 34. Measurements are given in millimetres 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 segment V, unless otherwise noted).

Systematics

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

**Ischnocera** Kellogg, 1896

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

**Brueelia**-complex

**Resartor**-group

**Genus** *Aratricerca* Gustafsson & Bush, 2017

*Aratricerca* Gustafsson & Bush, 2017: 108

Type species: *Aratricerca cirithra* Gustafsson & Bush, 2017. By original designation.

Included species

*Aratricerca cerata* new species


*Aratricerca macki* new species

*Aratricerca madagascariensis* new species

*Aratricerca cerata* Gustafsson, Zou & Bush, new species

(Figs 1–7)

Type host. *Zosterops capensis* Sundevall, 1850—Cape white-eye (Zosteropidae).

Type locality. Potchefstroom, North West Province, South Africa.

Diagnosis. A broad male proximal mesosome (Fig. 6) and modified parameres (Fig. 5) place *Aratricerca cerata* n. sp. closer to *A. madagascariensis* n. sp. (Figs 18–19) than to the other two species of *Aratricerca*. The head shape of *A. cerata* (Fig. 3) is unique. In both *A. cerata* (Fig. 1) and *A. madagascariensis* (Fig. 15) male abdominal segment XI extends less than in *A. macki* (Fig. 8) and *A. cirithra*. Also, the distal margin of the male abdomen is sclerotised in *A. cerata* (Fig. 1) and *A. madagascariensis* (Fig. 15), but not in the two species from meliphagid hosts.

*Aratricerca cerata* differs from *A. madagascariensis* in the following characters: male subgenital plate extends to distal margin of abdomen in *A. cerata* (Fig. 1), but not in *A. madagascariensis* (Fig. 15); male tergopleurite VI with 1 ps on each side in *A. cerata* (Fig. 1), but with 2 ps in *A. madagascariensis* (Fig. 15); male proximal mesosome quadratic in *A. cerata* (Fig. 6) but rounded and bulging anteriorly in *A. madagascariensis* (Fig. 19); lateral margins of mesosomal lobes bluntly rectangular in *A. cerata* (Fig. 6), but pointed in *A. madagascariensis* (Fig. 19); paramere with median, thumb-like modification in *A. cerata* (Fig. 5), but with lateral modification in *A. madagascariensis* (Fig. 18).
FIGURES 1–2. *Araticerca cerata* n. sp. 1, male habitus, dorsal and ventral views. 2, female habitus, dorsal and ventral views.
Abbreviations: *ps*—paratergal seta; *ss*—sutural seta; *sts*—sternal seta.
FIGURES 3–7. Aratricerca cerata n. sp. 3, male head, dorsal and ventral views. 4, male genitalia, dorsal view. 5, male paramere, dorsal view. 6, male mesosome, ventral view. 7, female subgenital plate and vulva margin, ventral view. Abbreviations: ads—anterior dorsal seta; lpmes—lateral posterior mesosomal seta; pst2—parameral seta 2; vms—vulval marginal seta; vos—vulval oblique setae; vss—vulval submarginal seta.
**Description. Both sexes.** Head shape and chaetotaxy as in Fig. 3; lateral margins of preantennal area convex, frons rounded. Dorsal anterior plate with wide thickening as in Fig. 3. Ventral anterior plate absent. Coni slender, short. Gular plate triangular, tapering anteriorly. Thoracic and abdominal segments as in Figs 1–2.

**Male.** As in Fig. 1. The holotype has two mts3 on each side, but these setae are absent in the paratypes and not illustrated. Male abdominal segment XI extended into a short, triangular tail, with sclerotised distal margin. Thoracic and abdominal chaetotaxy as in Fig. 1; 1 ps on each side of segment VI; tail with 1 ventral, 2 marginal, and 1 dorsal setae on each side. Basal apodeme (Fig. 4) constricted at about mid-length. Proximal mesosome (Fig. 6) broad, quadratic. Mesosomal lobes long and broad, with irregular lateral margins; section distal to gonopore wide, quadratic, without papillae; 2 gpmes sensilla on each side of gonopore. Gonopore widely open distally and narrowly open proximally, with small ventral crescent-shaped sclerite. Parameral heads (Fig. 5) bifid, with lateral finger much smaller than median finger, and displaced distally; parameral blades with median bulge; pst2 sensilla on terminal end. Measurements (n = 2, except TL where n = 1): TL = 2.08; HL = 0.37–0.40; Hw = 0.31–0.33; PRw = 0.21–0.24; PTW = 0.24–0.27; AW = 0.37–0.42.

**Female.** As in Fig. 2. Tergopleurite IX+X medianly continuous, but narrowed medianly (Fig. 2). Sternal plate III without antero-lateral thickenings. Thoracic and abdominal chaetotaxy as in Fig. 2; ss of segments II–III, V, and VIII not visible in single examined female, and illustrated tentatively; all other ss very short and remnants of gut content may obscure the seemingly absent setae. Subgenital plate (Fig. 7) diffuse distally and illustrated approximately; slender. Vulval margin (Fig. 7) with 5–6 long, slender vss on each side, and 6–7 short, thorn-like vss on each side; 5–6 vss on each side distal 2 vss on or near distal margin of subgenital plate, median to vss. Measurements (n = 1): TL = 2.49; HL = 0.41; HW = 0.36; PRW = 0.25; PTW = 0.27; AW = 0.46.

**Type material.** Ex Zosterops capensis [as Zosterops vaalensis]: Holotype ♂, Potchefstroom, North West Province (as “W. Transvaal”), South Africa, 18 May 1953, Brit. Mus. 1954-474 (NHML). Paratypes. 1♂, 1♀, same data as holotype (NHML).

**Etymology.** The species epithet is derived from “kératos”, Greek for “horn”, referring to the prominent median horns of the parameres.

**Aratricerca macki** Gustafsson, Zou & Bush, new species

(Figs 8–14)

**Type host.** Melidectes princeps Mayr & Gilliard, 1951—long-bearded melidectes (Meliphagidae)

**Other host.** Ptiloprora perstriata perstriata (de Vis, 1898)—gray-streaked honeyeater (Meliphagidae).

**Type locality.** Kawongu, Western Highlands Province, Papua New Guinea.

**Diagnosis.** Aratricerca macki n. sp. is most similar to A. cirithra Gustafsson & Bush, 2017, with which is shares the following characters: head trapezoidal (Fig. 10); preantennal area angular (Fig. 10); ventral anterior plate present (Fig. 10); female tergopleurite XI not sclerotised and not fused with tergopleurite IX+X (Fig. 9); female tergopleurite IX+X not fused medianly (Fig. 9); distal end of female subgenital plate does not reach vulval margin (Fig. 14); male parameres without modifications (Fig. 12); male abdominal segment XI clearly extended into largely transparent tail (Fig. 8); male subgenital plate does not reach terminal end of abdomen (Fig. 8).

**Aratricerca macki** and A. cirithra differ in the following characters: head shape subtriangular, with wider temples and proportionately narrower preantennal area in A. macki (Fig. 10) than in A. cirithra; median thickening of dorsal anterior plate in A. macki (Fig. 10), but absent in A. cirithra; male abdominal segment VI with 1 ps on each side in A. macki (Fig. 8) but with 2 ps on each side in A. cirithra; proximal mesosome tapering in A. macki (Fig. 13) but with anterior bulges on each side in A. cirithra; distal margin of mesosome bulging and slightly fringed in A. cirithra, but straight and smooth in A. macki (Fig. 13); female sternite III with anterior thickening in A. cirithra but without such thickening in A. macki (Fig. 9).

**Description. Both sexes.** Head trapezoidal (Fig. 10), lateral margins of preantennal area straight. Frons narrow and flattened. Dorsal anterior plate rectangular, with thickenings medially and laterally. Attachments of mandibular adductor muscles prominent. Ventral anterior plate present. Head chaetotaxy as in Fig. 10. Coni short. Gular plate small, short. Thoracic and abdominal segments as in Figs 8–9.
FIGURES 8–9. *Aratricerca macki* n. sp. 8, male habitus, dorsal and ventral views. 9, female habitus, dorsal and ventral views.
FIGURES 10–14. *Aratricerca macki* n. sp. 10, male head, dorsal and ventral views. 11, male genitalia, dorsal view. 12, male paramere, dorsal view. 13, male mesosome, ventral view. 14, female subgenital plate and vulva margin, ventral view.
Male. Tail of abdominal segment XI long, hyaline. Thoracic and abdominal chaetotaxy as in Fig. 8; 1 ps on each side of segment VI; tail with 1 ventral, 2 marginal, and 1 dorsal setae on each side. Basal apodeme (Fig. 11) slender, roughly rectangular, with rounded anterior end. Proximal mesosome tapering; mesosomal lobes wide, angular; section lateral to gonopore slightly rounded, without rugosities or papillae; 2 gpmes microsetae on each side of gonopore, which is widely open proximally but narrowly open distally (Fig. 13). Parameres (Fig. 12) with bifid head, and oval blades; pst2 sensilla on terminal end. Measurements ex Melidectes princeps (n = 3): TL = 2.43–2.55; HL = 0.46–0.48; HW = 0.37–0.41; PRW = 0.27–0.28; PTW = 0.29–0.31; AW = 0.47–0.51. Measurements ex Ptiloprora perstriata perstriata (n = 5, except TL where n = 3, and AW where n = 4): TL = 2.29–2.50; HL = 0.41–0.49; HW = 0.36–0.43; PRW = 0.24–0.30; PTW = 0.25–0.31; AW = 0.38–0.49.

Female. Tergopleurites IX+X separated medianly. Thoracic and abdominal chaetotaxy as in Fig. 9. Sternal plate III with no antero-lateral thickenings. Subgenital plate as in Fig. 14; vulval margin (in material from type host species) with 6–9 long, slender vms on each side, and 7–9 (1 female with 10 on each side) short, thorn-like vss on each side; 5–7 long, slender vos on each side; distally 1–2 vos on posterior margin of subgenital plate, median to vss, and 1 vos more distally. Material from P. p. perstriata with 4–7 vms, 5–8 vss, and 4–6 vos on each side; size, shape, and distribution as in material from type host. Measurements ex Melidectes princeps (n = 9, except AW where n = 7): TL = 2.33–2.93; HL = 0.48–0.53; HW = 0.43–0.47; PRW = 0.29–0.32; PTW = 0.31–0.35; AW = 0.46–0.60. Measurements ex Ptiloprora perstriata perstriata (n = 10, except TL and AW where n = 8): TL = 2.48–2.80; HL = 0.42–0.45 (0.44); HW = 0.38–0.40 (0.39); PRW = 0.25–0.28 (0.27); PTW = 0.27–0.30 (0.29); AW = 0.43–0.50.


Ex Ptiloprora sp.: 2♀, NE Tambul, elev. 2700 m, [Western Highlands Province], Papua New Guinea, 2 Oct. 1968, M. Nadchatrum & A.B. Mirza, BBM-NG-97437 (BPBM).

Etymology. The species epithet is in honour of Dr Andrew L. Mack, (Penn State University, Altoona, Pennsylvania, U.S.A.), in recognition of his work on the ecology and conservation of biodiversity in Papua New Guinea.

Remarks. Specimens from Ptiloprora perstriata perstriata have slightly wider and longer heads than those from the type host, and some fewer setae in all three sets of vulval setae, but their numbers overlap. Therefore, we consider the material from both host species as conspecific.

Aratricerca madagascariensis Gustafsson, Zou & Bush, new species

(Figs 15–19)

Type host. Randia pseudozosterops Delacour & Berlioz, 1931—Rand’s warbler (Bernieridae).

Type locality. Ranomafana National Park, Fianarantsoa, Madagascar (21.25628 S, 47.4218 E).

Diagnosis. Aratricerca madagascariensis n. sp. is most similar to Aratricerca cerata n. sp. To distinguish these two species, see diagnosis of A. cerata, above.

Description. Male. Head as in Fig. 16, with straight lateral margins of preantennal area. Frons flattened, slightly concave. Dorsal anterior plate with broad sublateral thickening as in Fig. 16. Ventral anterior plate absent. Head chaetotaxy as in Fig. 16. Coni short. Gular plate broadly triangular, with irregular lateral margins. Thoracic and abdominal segments and chaetotaxy as in Fig. 15; ss of segment II obscured by gut content in holotype, and have here been illustrated tentatively; 2 ps on each side of segment VI; tail with 1 dorsal and 1 ventral setae on each side. Subgenital plate does not reach distal end of abdomen. Tail of abdominal segment XI with sclerotised distal margin. Basal apodeme (Fig. 17) broad, slightly constricted at mid-length; anterior end rounded. Proximal mesosome (Fig. 19) rounded, and widening; mesosomal lobes angular; section distal to gonopore densely papillate marginally; 2 gpmes sensilla on each side of gonopore; gonopore as in Fig. 19. Parameral heads (Fig. 18) large, bifid; parameral blade with lateral modification as in Fig. 18; pst2 sensilla on terminal end. Measurements (n = 1): TL = 2.32; HL = 0.38; HW = 0.31; PRW = 0.23; PTW = 0.25; AW = 0.30.
FIGURES 15–19. Aratricerca madagascariensis n. sp. 15, male habitus, dorsal and ventral views. 16, male head, dorsal and ventral views. 17, male genitalia, dorsal view. 18, male paramere, dorsal view. 19, male mesosome, ventral view.
Female. Unknown.

Type material. Ex Randia pseudozosterops: Holotype ♂, 21.25628 S, 47.4218 E, elev. 920 m Main Park Entrance, PN Ranomafana, 3.5 km W of Ranomafana, Fianarantsoa, Madagascar, 15 Sep. 2009, N.L. Block, FMNH-HINS-2960110, voucher specimen for sequence Gennov.Raps.8.05.2011.3 (FMNH).

Etymology. The species epithet is derived from the type locality, the island of Madagascar.

Turdinirmoides Gustafsson & Bush, 2017

Degeeriella Neumann, 1906: 60 (in partim).
Bruedelia Kéler, 1936: 257 (in partim).
Type species: Degeeriella grandalae Clay, 1936. By original designation.

Included species

Turdinirmoides carpodaci (Mey, 2017)
  Carpodaciella carpodaci Mey, 2017: 171.
  Turdinirmoides carpodaci (Mey, 2017); Gustafsson et al. 2019d: 277.
Turdinirmoides grandalae (Clay, 1936)
  Degeeriella grandalae Clay, 1936: 912.
  Bruedelia grandalae (Clay, 1936); Price et al. 2003: 155.
  Turdinirmoides grandalae (Clay, 1936); Gustafsson & Bush 2017: 114.
Turdinirmoides janigai new species
Turdinirmoides rozsai new species
Turdinirmoides vasjukovae (Mey, 2017)
  Carpodaciella vasjukovae Mey, 2017: 172.
  Turdinirmoides vasjukovae (Mey, 2017); Gustafsson et al. 2019d: 277.

Turdinirmoides janigai Gustafsson, Zou & Bush, new species
(Figs 20–26)

Type host. Prunella collaris nipalensis (Blyth, 1843)—alpine accentor (Prunellidae).

Other host. Prunella collaris fennelli Deignan, 1964—alpine accentor (Prunellidae).

Type locality. Sakhuwasabha District, Nepal.

Diagnosis. Turdinirmoides janigai n. sp. is most similar to T. rozsai n. sp., sharing the following characters: tps absent on all male tergopleurites; 2 ps on each side of male abdominal segment VI; pst1 not close to pst2; female subgenital plate pentagonal. However, these two species can be separated by the following characters: head longer than broad in T. janigai (Fig. 22), but as long as broad in T. rozsai (Fig. 29); 1 ps present on each side of female abdominal segment III in T. janigai (Fig. 21), but absent in T. rozsai (Fig. 29); proximal mesosome with smooth margins in T. janigai (Fig. 25), but with irregular margins in T. rozsai (Fig. 32); mesosomal lobes rounded with anterior hooks, distal fringe, and 2 lpmes microsetae on each side in T. rozsai (Fig. 32), but bluntly triangular, without hooks, fringes, or lpmes in T. janigai (Fig. 25); female subgenital plate not reaching cross-piece in T. janigai (Fig. 26), but overlapping with detached cross-piece in T. rozsai (Fig. 33); detached cross-piece reaches vulval margin only medially and laterally in T. janigai (Fig. 26), but along entire length in T. rozsai (Fig. 33).

Description. Both sexes. Head as in Fig. 22, with lateral margins of preantennal area convex, and frons slightly concave medially. Marginal carina not interrupted laterally. Dorsal preantennal suture extends slightly median to ads. Dorsal anterior plate with sinusus thickening medially. Ventral anterior plate present. Head chaetotaxy as in Fig. 22. Coni short, broad. Temples rounded. Gular plate roughly triangular. Thoracic and abdominal segments as in Figs 20–21.
FIGURES 20–21. *Turdinirmoides janigai* n. sp. 20, male habitus, dorsal and ventral views. 21, female habitus, dorsal and ventral views.
**Male.** Subgenital plate divided into sternal plate VII and subgenital plate covering segments VIII–XI. Thoracic and abdominal chaetotaxy as in Fig. 20; *sts* present on segment VII; *tsp* absent on tergopleurite VIII. Basal apodeme (Fig. 23) rounded rectangular, slightly constricted in distal half. Proximal mesosome (Fig. 25) broad, rounded rectangular. Mesosomal lobes roughly triangular, with broad dorsal transverse fingers in distal end; 2 *gpmes* sensilla on each side of gonopore. Gonopore narrowly open distally, antero-lateral extensions broad, rounded; distal section with internal V-shaped thickenings. Parameral heads (Fig. 24) large, bifid. Parameral blades roughly oval; *pts1* sensillum, central near distal end of paramere; *pts2* sensillum, near distal margin. Measurements ex *Prunella collaris nipalensis* (n = 2): TL = 2.02–2.05; HL = 0.41–0.42; HW = 0.38–0.39; PRw = 0.25; PTw = 0.35; AW = 0.43–0.48. Measurements ex *Prunella collaris fennelli* (n = 1): TL = 1.93; HL = 0.42; HW = 0.39; PRw = 0.24; PTw = 0.35; AW = 0.45.

**Female.** Thoracic and abdominal chaetotaxy as in Fig. 21; *ss* present on tergopleurite VIII. Tergopleurite IX+X fused with tergopleurite XI for most of length, narrowing distally. Subgenital plate (Fig. 26) roughly pentagonal; detached cross-piece reaches vulval margin only medianly and at extreme lateral ends. Vulval margin (Fig. 26) gently rounded, with 4–5 long, slender *vms* on each side, and 5–8 short, thorn-like *vss* on each side; 3–5 long, slender *vos* on each side; distal 1 *vos* on detached cross-piece, median to *vss*. No difference in vulval chaetotaxy among specimens from different host subspecies. Measurements ex *Prunella collaris nipalensis* (n = 5): TL = 2.34–2.43; HL = 0.43–0.45; HW = 0.40–0.44; PRw = 0.26–0.28; PTw = 0.36–0.40; AW = 0.49–0.55. Measurements ex *Prunella collaris fennelli* (n = 1): TL = 2.23; HL = 0.44; HW = 0.42; PRw = 0.27; PTw = 0.37; AW = 0.48.

**Type material.** Ex *Prunella collaris nipalensis*: Holotype ♂, Sakhuwasabha District, [Kosi Zone, Eastern Region,] Nepal, Nepal, 5 Aug. 1973, HE-0663, 24602 [on reverse] (NHML). Paratypes: 1♀, same data as holotype (NHML); 1♂, Base Camp, elev. 4900 m, Makalu, Nepal, 21 Apr. 1973, M. Daniel, IM-14021–2 (PMSL); 1♀, same locality and collector, 5 May 1973, IM-14023 (PMSL); 1♀, same locality and collector, 22 Apr, 1973, IM-14024 (PMSL); 1♀, same locality and collector, 28 Apr. 1973, IM-14025 (PMSL).

Non-types: ex *Prunella collaris fennelli*: 1♂, 1♀, Wu-sheh, Taiwan [as Formosa], 1959, PF-6070, 24601 [on reverse] (NHML).

**Etymology.** The species epithet is in honour of Dr Marián Janiga (Žilina University, Slovakia), in recognition of his long and dedicated work on the biology of *Prunella collaris*, including its parasites. Although *Turdinirmoides janigai* has not been recorded in his samples from Slovakia (e.g. Janiga & Kubaškova 2000), we hope that Marián will find it in future surveys in the High Tatras.

**Remarks.** No significant morphological differences have been found among specimens from the two host subspecies. Although *Prunella collaris* includes several subspecies distributed as far west as Morocco, occurring over many mountains in continental Europe (Clements *et al.* 2019), no species of *Turdinirmoides* has been found in the long-term surveys of this host species in the Carpathians (Janiga & Kubaškova 2000; Janiga & Mičková 2004; Janiga 2018), suggesting that the distribution of *T. janigai* may be limited to South Asia, as are all other known *Turdinirmoides*.

**Turdinirmoides rozsai** Gustafsson, Zou & Bush, new species (Figs 27–33)

**Type host.** *Carpodacus subhimachala* (Hodgson 1836)—crimson-browed finch (Fringillidae).

**Type locality.** Sakhuwasabha District, Nepal.

**Diagnosis.** *Turdinirmoides rozsai* n. sp. is most similar to *T. janigai* n. sp. For a comparison between these species, see *T. janigai* above.

**Description.** **Both sexes.** Head subtriangular, broad and rounded (Fig. 29), with lateral margins of preantennal area convex, and frons shallowly concave medially. Marginal carina interrupted laterally. Dorsal preantennal suture extends slightly median to *ads*. Dorsal anterior plate with sinuous thickening at about mid-length. Ventral anterior plate present. Head chaetotaxy as in Fig. 29. Coni short, broad. Temples rounded. Gular plate spade-shaped, with convex lateral margins. Thoracic and abdominal segments as in Figs 27–28.
FIGURES 27–28. *Turdinirmoides rozsai* n. sp. 27, male habitus, dorsal and ventral views. 28, female habitus, dorsal and ventral views.
FIGURES 29–33. *Turdinirmoides rozsai* n. sp. 29, male head, dorsal and ventral views. 30, male genitalia, dorsal view. 31, male paramere, dorsal view. 32, male mesosome, ventral view. 33, female subgenital plate and vulva margin, ventral view. Abbreviation: *gpmes*—gonoporal posterior mesosomal seta.
FIGURES 34–35. *Timalinirmus curvus* n. sp. 34, male habitus, dorsal and ventral views. 35, female habitus, dorsal and ventral views. Abbreviation: *tps*—tergal posterior seta.
FIGURES 36–40. *Timalinirmus curvus* n. sp. 36, male head, dorsal and ventral views. 37, male genitalia, dorsal view. 38, male paramere, dorsal view. 39, male mesosome, ventral view. 40, female subgenital plate and vulva margin, ventral view.
**Male.** Subgenital plate divided into sternal plate VII and subgenital plate covering segments VIII–XI. Thoracic and abdominal chaetotaxy as in Fig. 27; tps absent on all tergopleurites; sts present on male sternite VII; abdominal setae in general short. Basal apodeme (Fig. 30) narrowing markedly anteriorly. Proximal mesosome (Fig. 32) with irregular lateral and anterior margins. Mesosomal lobes broad, rounded, with anterior hook and fringed distal ends; 3 gpmes microsetae on each side of gonopore; 2 lpmes on each side on posterior margin of lobes; gonopore roughly T-shaped, with broad triangular antero-lateral extensions and shallow anterior margin. Parameral heads (Fig. 31) bifid, and blades roughly oval; pst1 sensillum, central; pst2 microsetae, on distal margin. Measurements (n = 1): TL = 2.13; HL = 0.46; HW = 0.45; PRW = 0.27; PTW = 0.42; AW = 0.53.

**Female.** Thoracic and abdominal chaetotaxy as in Fig. 28; ps present on female abdominal segment III. Subgenital plate (Fig. 33) pentagonal, overlapping distally with detached cross-piece, but not fused to this; detached cross-piece follows vulval margin for entire length. Vulval margin (Fig. 33) slightly concave medianly, with 5 short, slender vms on each side, and 5–6 short, thorn-like vss on each side; 6 long, slender vos on each side; distal 2 vos on detached cross-piece, median to vss. Measurements (n = 1): TL = 2.56; HL = 0.48; HW = 0.51; PRW = 0.30; PTW = 0.46; AW = 0.66.

**Type material.** Ex *Carpodacus subhimachala*: Holotype ♂, Sankhuwasabha District, [Kosi Zone, Eastern Region,] Nepal, 3 Aug. 1973, HE-0658 (NHML). Paratype: 1♀, same data as holotype (NHML).

**Etymology.** The species epithet honours our friend and colleague Dr Lajos Rózsa (MTA Centre for Ecological Research, Hungarian Academy of Sciences, Tihany, Hungary), in recognition of his many varied, novel and thought-provoking contributions to the study of Phthiraptera.

### Timalinirmus Mey, 2017

*Brueelia* Kéler, 1936a: 257 (*in partim*).
*Turdinirmoides* Gustafsson & Bush, 2017: 112 (*in partim*).  
**Type species:** *Brueelia hribali* Najer & Sychra [in Najer et al.], 2012. By original designation.

**Included species**  
*Timalinirmus hribali* (Najer & Sychra [in Najer et al.], 2012)  
*Timalinirmus hribali* (Najer & Sychra [in Najer et al.], 2012); Mey, 2017: 170.  
*Timalinirmus curvus* new species

### Timalinirmus curvus Gustafsson, Zou & Bush, new species  
(Figs 34–40)

**Type host.** *Yuhina castaniceps plumbeiceps* (Godwin-Austen 1877)—striated yuhina (*Zosteropidae*).  
**Type locality.** Shiwandashan National Park, Guanxi Province, China.  
**Diagnosis.** *Timalinirmus curvus* n. sp. can be separated from *Timalinirmus hribali* by the following characters: head proportionately shorter and broader, especially in the temples, in *T. curvus* (Fig. 36) than in *T. hribali*; male subgenital plate reaches distal end of abdomen in *T. curvus* (Fig. 34), but does not reach distal end of abdomen in *T. hribali*; female tergopleurite XI much reduced in *T. hribali*, but large in *T. curvus* (Fig. 35); tergopleurite III in both sexes of *T. curvus* with ps reaching to or beyond spiracle opening IV (Figs 34–35), but not reaching spiracle opening IV in *T. hribali*; proximal mesosome with flat anterior margin in *T. curvus* (Fig. 39), but with pointed anterior margin in *T. hribali*. Note that the male genitalia of *T. hribali* appear to have been illustrated from a specimen in which they are partly everted; hence, an adequate comparison between the genitalia of these two species cannot be made.

**Description.** Both sexes. Head trapezoidal (Fig. 36), with lateral margins of preantennal area convex and frons shallowly concave. Marginal carina interrupted laterally. Dorsal preantennal suture does not extend much median to ads. Dorsal anterior plate with prominent posterior sinus thickening across all of plate. Ventral anterior plate
absent. Head chaetotaxy as in Fig. 36. Coni about as long as scape, broad. Temples angular. Gular plate roughly triangular. Thoracic and abdominal segments as in Figs 34–35.

**Male.** Subgenital plate (Fig. 34) covering segments VII–XI, not divided. Thoracic and abdominal chaetotaxy as in Fig. 34; tergopleurites VII–VIII with 1 ps on each side; sternite VII with 1 sts on each side. Basal apodeme (Fig. 37) widening distally. Proximal mesosome (Fig. 39) elongated, rounded, constricted at mid-length. Meso-somal lobes wide, angular on anterior end, with distal end hooked and slightly serrated on median margin; narrow dorsal transverse fingers in distal end; 3 gpmes microsetae on each side of gonopore. Parameres (Fig. 38) of unique shape within Brueelia-complex, strongly sinuous; pst1 sensillum, near distal end; pst2 microsetae, on distal margin. Measurements (n = 2): TL = 1.78–1.83; HL = 0.35–0.36; HW = 0.32; PRW = 0.22; PTW = 0.27–0.28; AW = 0.33–0.39.

**Female.** Thoracic and abdominal chaetotaxy as in Fig. 35; ss not visible in either examined female. Tergopleurite IX+X fused with tergopleurite XI only median of setae. Subgenital plate (Fig. 40) roughly triangular, but with somewhat sinuous lateral margins; detached cross-piece reaches vulval margin for entire length. Vulval margin (Fig. 40) gently rounded, with 5 short, slender vns on each side and 7 thorn-like vss on each side; vss longer than vns; 3–5 long, slender vds on each side; distal 1 vos on detached cross-piece, median to vss. Measurements (n = 3): TL = 2.08–2.27; HL = 0.37–0.39; HW = 0.34–0.37; PRW = 0.24–0.25; PTW = 0.28–0.32; AW = 0.39–0.56.

**Type material.** Ex *Yuhina castaniceps plumbeiceps*: Holotype ♀, Shiwan dashan National Park, Guanxi Province, China, 26 Apr. 2005, S.E. Bush & D.H. Clayton, host MBR-6717, lice P-667 (NHML). **Paratypes:** 1♂, 2♀, same data as holotype (PIPR).

**Non-types:** Ex *Yuhina castaniceps plumbeiceps*: 1♀, Babaoshan, Nanling Mountains, Guangdong Province, China, 23 Jul. 2017, D. Su & X. Chu, Bird-ID J0098, Louse-ID GD-PHTH-00275 (IZGAS).

**Etymology.** The species epithet, “curvus”, is Latin for “bent”, referring to the shape of the parameres.

**Remarks.** The male genitalia of the two males examined are partially everted, with the parameres folded anteriorly; therefore, non-everted parameres may appear slightly different from what is illustrated here.

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**Key to the species of the genera Aratricerca, Timalinirmus, and Turdinirmoides**

**Note:** We have not seen specimens of *Tur dinirmoides carpodaci* and *Tur dinirmoides vasjukovae*. These species were not completely described, and were illustrated with habitus photos, drawings of male genitalia and of frons. The male genitalia of *T. vasjukovae* are most similar to those of *T. rozsai*, whereas the male genitalia of *T. carpodaci* are not similar to those of any of the other species. We have placed *Tur dinirmoides carpodaci* and *T. vasjukovae* in the key based on the characters given by Mey (2017), but redescriptions of both species are needed.

1. Lateral margins of ptero thorax roughly parallel (Fig. 1); at least sternal plate II with antero-lateral thickening (Fig. 1); male abdominal segment XI extended into triangular tail (Fig. 1) .................................................. 2.
   - Lateral margins of pterothorax divergent posteriorly (Fig. 20); no antero-lateral thickening of any sternal plate (Fig. 20); male abdominal segment XI not extended into triangular tail (Fig. 20) .................................................. 5.
2. Ventral anterior plate present (Fig. 3); parameres without marginal modifications (Fig. 5); proximal mesosome slender (Fig. 6); tail of male abdominal segment XI thinly sclerotised distally (Fig. 1) .................................................. 3.
   - Ventral anterior plate absent (Fig. 10); parameres with marginal modifications (Figs 12, 18); proximal mesosome broad (Figs 13, 19); tail of male abdominal segment XI with wide distal sclerotised plate (Fig. 15) .................................................. 4.
3. Male abdominal segment VI with 1 ps on each side (Fig. 1); proximal mesosome tapering slightly anteriorly (Fig. 6); distal margin of mesosome slight, smooth (Fig. 6); female sternite III without anterior thickening (Fig. 2) .................. Aratricerca macki
   - Male abdominal segment VI with 2 ps on each side (Fig. 15); proximal mesosome widening anteriorly; distal margin of mesosome bulging, fringed; female sternite III with anterior thickening .................. Aratricerca ciritira
4. Frons convex (Fig. 10); lateral margins of preantennal area convex (Fig. 10); male tergopleurite VI with 1 ps on each side (Fig. 8); male proximal mesosome quadratic (Fig. 13); paramere with median, thumb-like modification (Fig. 12) .................. Aratricerca cerauta
   - Frons concave (Fig. 16); lateral margins of preantennal area straight (Fig. 16); male tergopleurite VI with 2 ps on each side (Fig. 15); male proximal mesosome rounded, widening anteriorly (Fig. 19); paramere with lateral, thumb-like modification (Fig. 18) .................. Aratricerca madagascariensis
5. Dorsal preantennal suture medially continuous posterior to dorsal anterior plate .................. 6.
   - Dorsal preantennal suture medially discontinuous posterior to dorsal anterior plate (Fig. 22) .................. 7.
6. Female subgenital plate roughly triangular; proximal mesosome narrow .................. Turdinirmoides carpodaci
   - Female subgenital plate roughly pentagonal; proximal mesosome broad .................. Turdinirmoides vasjukovae
7. Ventral anterior plate present (Fig. 22); male subgenital plate divided (Fig. 20); sts present on male abdominal segment VII (Fig. 20) .......................... 8.
   - Ventral anterior plate absent (Fig. 10); male subgenital plate divided (Fig. 20) .................. 9.
- Female subgenital plate pentagonal (Fig. 26); 
  - male subgenital plate not reached by distal end of abdomen; female tergopleurite X much reduced; proximal mesosome with 

8. Female subgenital plate triangular; tps present on male tergopleurites V–VIII; males with 1 ps on each side of abdominal segment VI; pst1 close to pst2 ....................................................... Turdinirmoides grandalae. 
  - Female subgenital plate pentagonal (Fig. 26); tps absent on all male tergopleurites (Fig. 20); male with 2 ps on each side of 

9. Female without ps on abdominal segment III (Fig. 28); proximal mesosome with irregular margins (Fig. 32); mesosomal lobes 
  - rounded with anterior hooks, distal fringe, and 2 lpmes microsetae on each side (Fig. 32); female subgenital plate overlapping 

10. Male subgenital plate does not reach distal end of abdomen; female tergopleurite XI much reduced; proximal mesosome with 
  - pointed anterior margin .............................................................. Timalinirmus krabali. 
  - Male subgenital plate reaches distal end of abdomen (Fig. 34); female tergopleurite XI large (Fig. 35); proximal mesosome with 

**Discussion**

Collectively, the species included in the *Resartor*-group are known from hosts belonging to 13 different families (Table 1). They include families placed in the parvorders Passerida and parvorder Corvides, and families that do not belong to either of these major radiations (Barker et al. 2004; Jönsson & Fjeldså 2006). This host distribution is in contrast to that of the species in two major genera of the *Brueelia*-complex, *Brueelia* and *Guimaraesiella*, which primarily occur on hosts in the Passerida and Corvides, respectively (Gustafsson & Bush 2017).

Several of the genera in the *Resartor*-group appear to be largely or entirely host family specific (*Indoceoplane*tes, *Resartor, Turdinirmus*), whereas others are more widely distributed (*Aratricerca, Turdinirmoides*). This mixture of specificity parallels the two other major radiations of *Brueelia*-complex lice on passeriform hosts. For instance, in the *Guimaraesiella*-group, *Corvonirmus* is restricted to the Corvidae, whereas *Guimaraesiella* is known from many host families across the world (Gustafsson & Bush 2017). This underlines the general trend in the *Brueelia*-complex, that generic circumscription is more useful when based on morphological and genetic data than when based on host associations.

With the exception of *Titanomessor* and *Aratricerca*, all genera in the *Resartor*-group are known exclusively from the Indo-Malayan and Australo-Papuan regions. The species described here considerably extend the geographical and host ranges of both *Turdinirmoides* and *Aratricerca*. This expansion is most notable for *Aratricerca*, which in the Indo-Malayan and Australo-Papuan regions, is known from New Guinea and Africa. Based on host associations, we speculate that lice of this genus may occur in the Indo-Malayan region as well. By contrast, no species in the *Resartor*-group are yet known from the Americas, and few species are known from the more northern areas of Eurasia (Table 2). Our poor knowledge of the *Resartor*-group from tropical Africa may be due, in part, to our lack of data of African species of the *Brueelia*-complex in general (Gustafsson et al. 2019b).

Notably, several species in the *Resartor*-group are primarily known from hosts living at high altitudes. For instance, all known species of *Turdinirmoides* and *Ceratocista* parasitise hosts that mainly occur at high altitudes, and many species of *Resartor* are only found on hosts that live at high altitudes. Considering that few studies on lice from high-altitude hosts have been published, current host distribution patterns within the *Resartor*-group may simply be due to sampling bias. Gustafsson et al. (2019c) sampled a variety of birds above 2000 m in southwestern China, collecting several species of *Resartor*. Recent collection efforts in the same region found more *Resartor* species, whereas collections at lower elevations in other parts of China do not include this genus (DR Gustafsson & F Zou, unpublished data). More research at high elevations throughout the world is needed to establish whether the species of the *Resartor*-group are high-elevation specialists.
### TABLE 2. List of species included in the Resartor-group, with host associations.

Host ranges are approximate, following maps used by Bush et al. (2016). Abbreviations: AP—Australo-Papuan; AT—Afrotropical (including Madagascar); IM—Indo-Malayan; PA—Palearctic.

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<thead>
<tr>
<th>Louse species</th>
<th>Host species</th>
<th>Geographical range of host</th>
<th>Host family</th>
</tr>
</thead>
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<tr>
<td><strong>Aratricerca cerata</strong> new species</td>
<td>Zosterops capensis Sundevall, 1850</td>
<td>AT</td>
<td>Zosteropidae</td>
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<td><strong>Aratricerca cirithra</strong> Gustafsson &amp; Bush, 2017</td>
<td>Ptilopora gusei guisei (De Vis, 1894)</td>
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<td>Meliphagidae</td>
</tr>
<tr>
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<td>Melidecetes princeps Mayr &amp; Giliard, 1951</td>
<td>AP</td>
<td>Meliphagidae</td>
</tr>
<tr>
<td><strong>Aratricerca madagascariensis</strong> new species</td>
<td>Ptilopora perstriata perstriata (De Vis, 1898)</td>
<td>AP</td>
<td>Meliphagidae</td>
</tr>
<tr>
<td>Ceratocista antennata (Ansari, 1956)</td>
<td>Grammatoptila striata sikkimensis (Ticehurst, 1924)</td>
<td>IM</td>
<td>Leiothrichidae</td>
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<td><strong>Indoceoplanetes (Indoceoplanetes) indonesiana</strong> (Eichler, 1947)</td>
<td>Coracina striata difficilis (Harter, 1895)</td>
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<td>Campephagidae</td>
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<td><strong>Indoceoplanetes (Capnodella) laurocorythes</strong> Gustafsson &amp; Bush, 2017</td>
<td>Coracina striata panayensis (Steere, 1890)</td>
<td>IM</td>
<td>Campephagidae</td>
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<td>Coracina striata sumatrensis (Müller, 1843)</td>
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<td>Campephagidae</td>
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<td><strong>Indoceoplanetes (Capnodella) holopolium</strong> Gustafsson &amp; Bush, 2017</td>
<td>Edolisoma holopolium holopolium (Sharpe, 1888)</td>
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<td>Campephagidae</td>
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<td>Oriolus chinensis diffus Sharpe, 1877</td>
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<td>Oriolidae</td>
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<td><strong>Maculinirmus mundus</strong> (Nitzsch [in Giebel], 1866)</td>
<td>Oriolus oriolus oriolus (Linnaeus, 1758)</td>
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<td>Oriolidae</td>
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<td>Maculinirmus novaehollandiae (Mey, 2017)</td>
<td>Cinclusoma punctatum punctatum (Shaw, 1794)</td>
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<td>Cinclusomatidae</td>
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<td><strong>Resartor albofulvus</strong> Gustafsson et al., 2018</td>
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<td>Leiothrichidae</td>
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<td><strong>Resartor apimimus</strong> Gustafsson et al., 2018</td>
<td>Heterophasia picaoides wayti (Ogilvie-Grant, 1910)</td>
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<td>Minla ignotincta mariae La Touche, 1921</td>
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<td>Leiothrichidae</td>
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<td>Alcippe fratercula yunnanensis Harington, 1913</td>
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<td>Sylvidae</td>
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<td>Leiothrichidae</td>
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<td>Trochalopteron affine blythi Verreaux, 1871</td>
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<td>Leiothrichidae</td>
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<td>Leiothrichidae</td>
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<td>Trochalopteron affine bethelae (Rand &amp; Flemming, 1956)</td>
<td>IM</td>
<td>Leiothrichidae</td>
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<table>
<thead>
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<th>Louse species</th>
<th>Host species</th>
<th>Geographical range of host</th>
<th>Host family</th>
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<tr>
<td>Resartor longisuturalis</td>
<td>Actinodura cyanoureptera wingatei (Ogilvie-Grant, 1900)</td>
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<td>Resartor novofacies</td>
<td>Trochalopteron subunicolor subunicolor (Blyth, 1843)</td>
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<td>Leiothrix argentauris tahanensis (Yen, 1934)</td>
<td>IM</td>
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<td>Resartor weigoldi</td>
<td>Trochalopteron formosum formosum Verneaux, 1869</td>
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<td>Leiothrichidae</td>
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<td>Mixornis gularis (Horsfield, 1822)</td>
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<td>Timaliidae</td>
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<td>Timalinirmus curvis new species</td>
<td>Yuhina castaniceps plumbeiceps (Godwin-Austen, 1877)</td>
<td>IM</td>
<td>Zosteropidae</td>
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<td>Titanomessor sexloba</td>
<td>Laniarius erythrogaster (Cretzschmar, 1829)</td>
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<tr>
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<tr>
<td>Turdinirmoides grandalae</td>
<td>Grandala coelicolor Hodgson, 1843</td>
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<tr>
<td>Turdinirmoides janigai new species</td>
<td>Prunella collaris femelli Deignan, 1964</td>
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<td>Prunella collaris nipalensis (Blyth, 1843)</td>
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<tr>
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<td>Turdus obscurus Gmelin, 1789</td>
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*This species has also been recorded in New Zealand from Turdus merula merula, where this host was introduced by human agency (Palma 2017: 98, as Brueelia merulensis).
Acknowledgements

Work was supported by the Swedish Taxonomy Initiative (36/07 1.4), the Introduction of Full-Time High-Level Talent Fund of the Guangdong Academy of Sciences grant (2018GDASCX-0809), the GDAS Special Project of Science and Technology Development (2019GDASYL-0203001, GIABR-GJRC201701), the Pearl River Talent Recruitment Program of Guangdong Province (2019QNO1N968), the National Science Foundation (USA; DEB-1050706, DEB-0344430), and the NSF- Dimensions US-China [1926738 (US), 31961123003 (China)]. Loans of specimens were kindly arranged by Paul Brown (NHML) and Tomi Trilar (PMSL). We thank our former colleague Xingzhi Chu for collecting some of the Chinese louse samples. We are indebted to Ricardo L. Palma (Museum of New Zealand, Wellington, New Zealand) for his editing and revision of the first draft of this paper, and to Terry D. Galloway (Department of Entomology, University of Manitoba, Winnipeg, Manitoba, Canada) for helpful comments that improved this paper.

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