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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 pseudozosterops* Delacour & Berlioz, 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 *Yuhina 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-

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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.

Genus (subgenus)	Host distribution	Geographical range	**Number of species**
Aratricerca Gustafsson & Bush, 2017	Bernieridae, Meliphagidae, Zosteropidae	Afrotropical, Australo-Papuan	4
Ceratocista Gustafsson & Bush, 2017	Timaliidae	Indo-Malayan	1
Indoceoplanetes (*Capnodella*) Gustafsson & Bush, 2017	Campephagidae	Afrotropical, Australo-Papuan, Indo-Malayan	2
Indoceoplanetes (*Indoceoplanetes*) Gustafsson & Bush, 2017	Campephagidae	Australo-Papuan, Indo-Malayan	1
Maculinirmus Złotorzycka, 1964	Oriolidae	Indo-Malayan, Palearctic	3
Resartor Gustafsson & Bush, 2017	Leiothrichidae, Paradoxornithidae	Indo-Malayan	14
Timalinirmus Mey, 2017	Timaliidae, Zosteropidae	Indo-Malayan	2
Titanomessor Gustafsson & Bush, 2017	Malaconotidae	Afrotropical	1
Turdinirmoides Gustafsson & Bush, 2017	Fringillidae, Muscicapidae, Prunellidae	Indo-Malayan	5
Turdinirmus Eichler, 1951	Turdidae	Palearctic, Indo-Malayan, Australo-Papuan	6

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 N*i* 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
Ischnocera Kellogg, 1896: 63.

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 cirithra Gustafsson & Bush, 2017.
Aratricerca cirithra Gustafsson & Bush, 2017: 109.
Aratricerca macki **new species**
Aratricerca madagascariensis **new species**

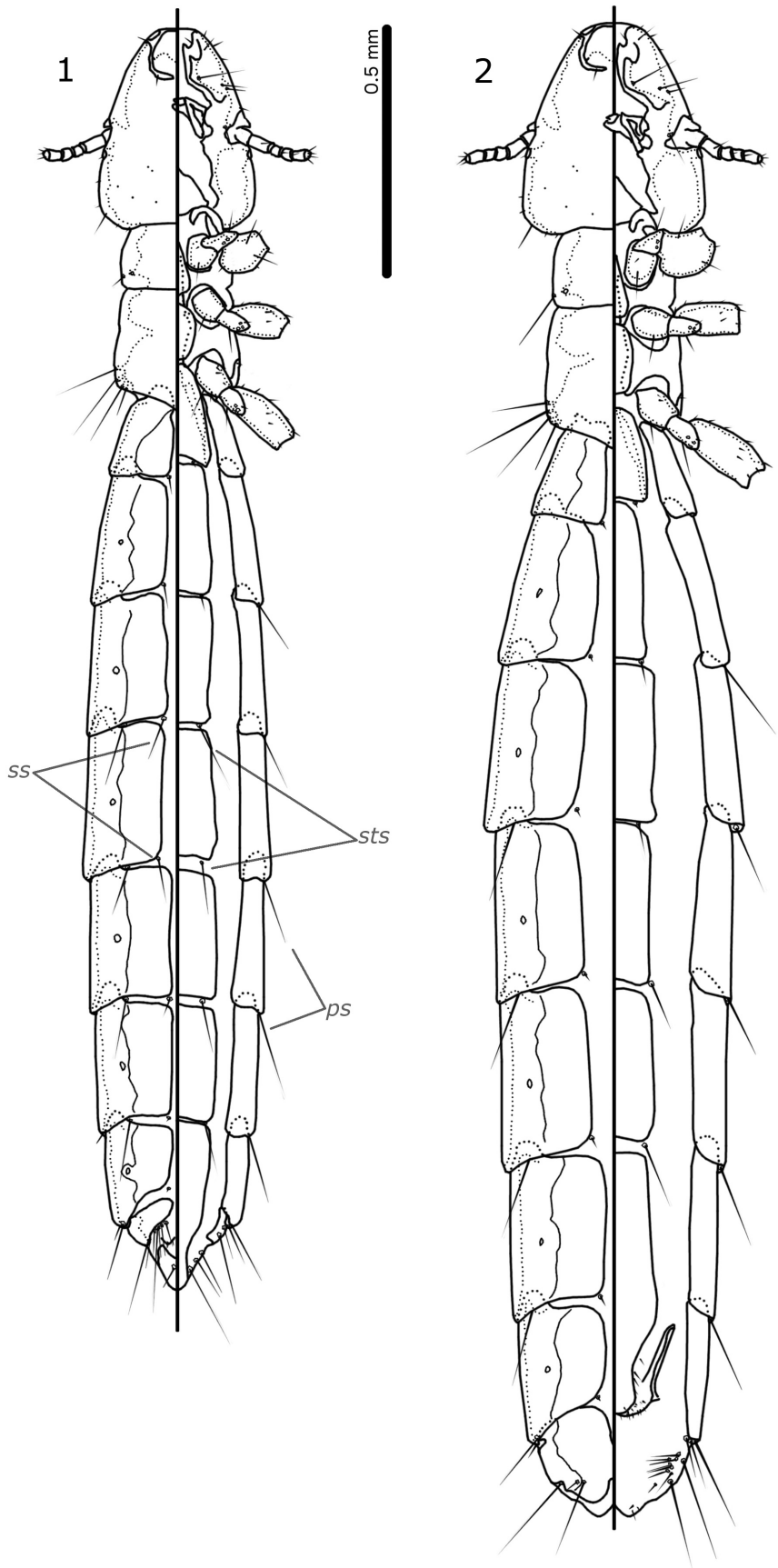
Aratricerca cerata Gustafsson, Zou & Bush, new species
(Figs 1–7)

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

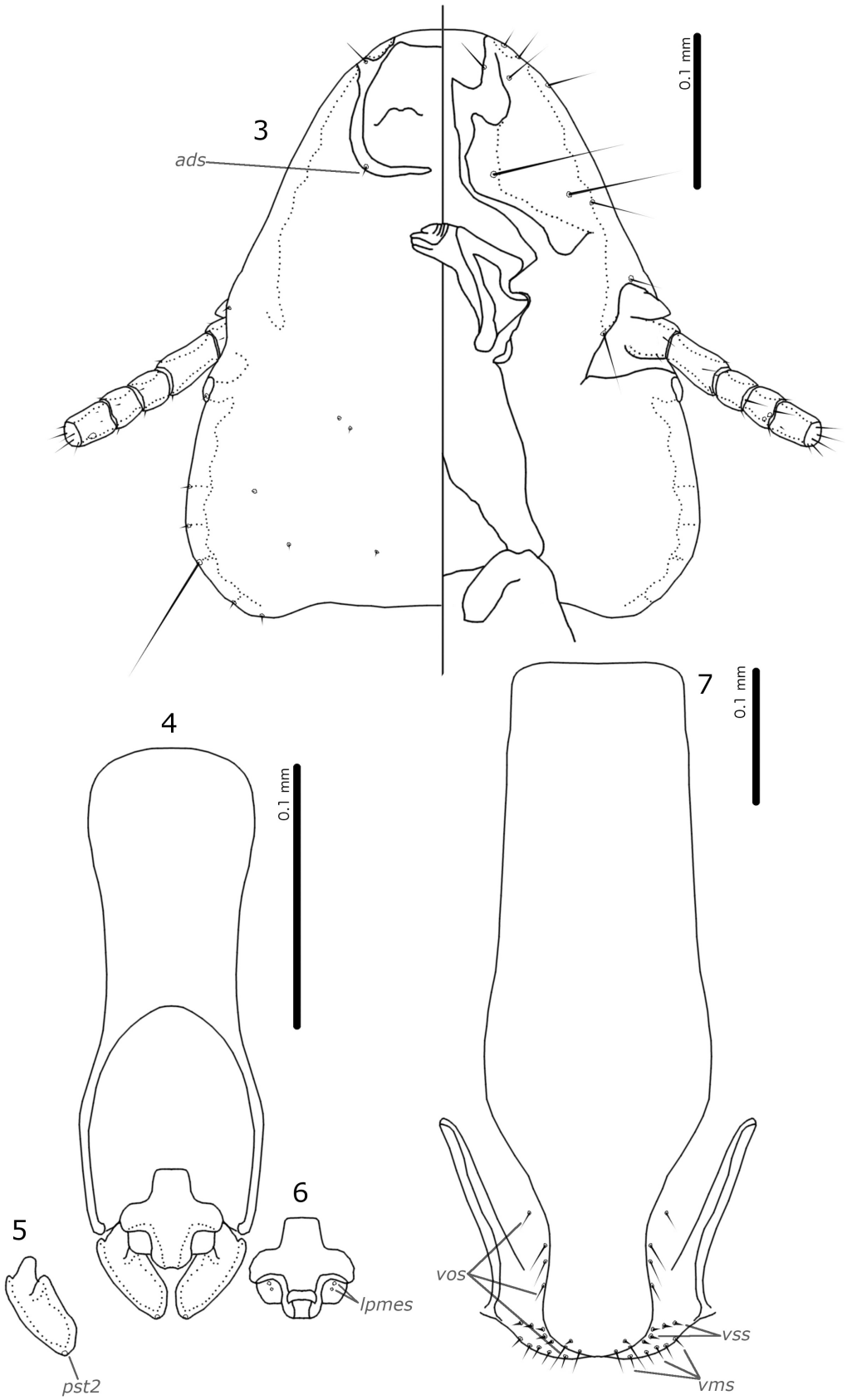
Type locality. Potchefstroom, North West Province, South Africa.

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. *Aratricerca 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 *vms* on each side, and 6–7 short, thorn-like *vss* on each side; 5–6 *vos* on each side distal 2 *vos* 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)

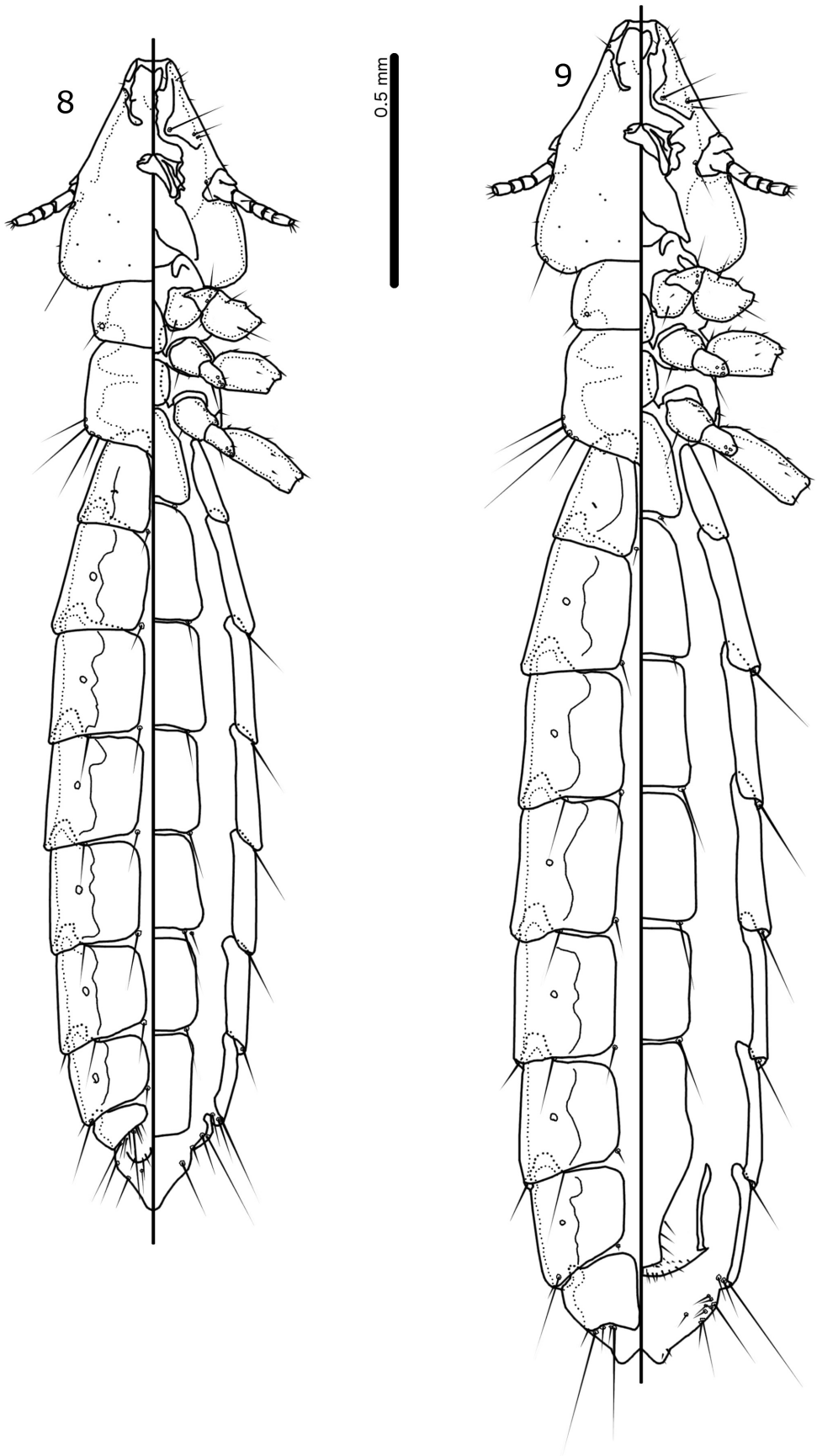
Other host. *Ptiloprora perstriata perstriata* (de Vis, 1898)—gray-streaked honeyeater (Meliphagidae).

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

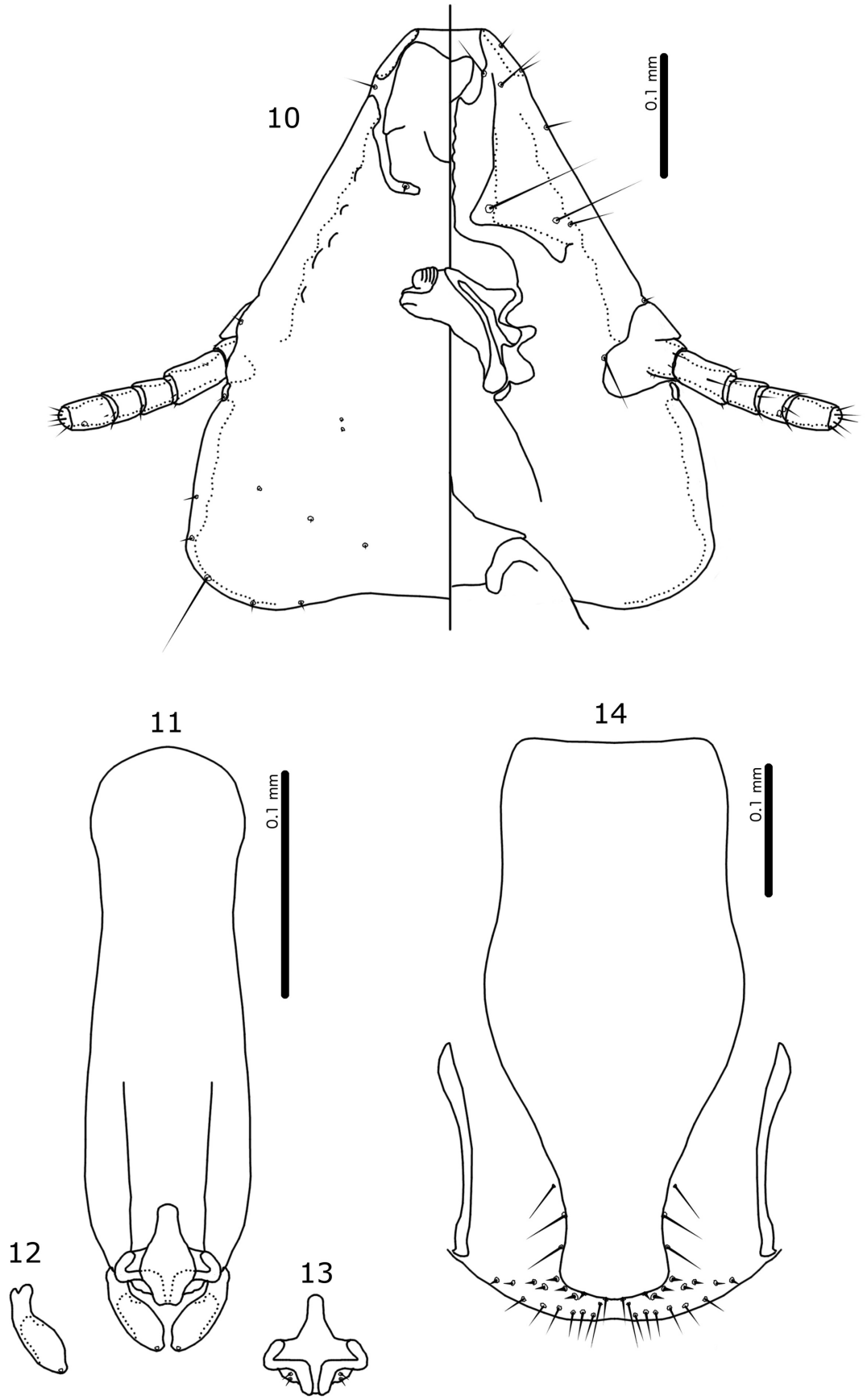
Diagnosis. *Aratricerca macki* **n. sp.** is most similar to *A. cirithra* Gustafsson & Bush, 2017, with which is shares the following characters: head trapezoidal (Fig. 10); preantennal area angular (Fig. 10); ventral anterior plate present (Fig. 10); female tergopleurite XI not sclerotised and not 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 medianly 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.

Type material. Ex ***Melidectes princeps*: Holotype** ♂, Kawongu, elev. 7200 ft, Western Highlands Province, Papua New Guinea, 16 Jun. 1963, H. Clissold, BBM-NG-28139 (BPBM). **Paratypes:** 1♂, 1♀, same data as holotype (BPBM); 1♀, same locality and collector as holotype, 15 Jun. 1963, BBM-NG-28128 (BPBM); 1♂, 7♀, same locality and collector as holotype, 14 Jun. 1963, BBM-NG-28123 (BPBM).

Non-types: Ex *Ptiloprora perstriata perstriata*: 1♂, Kawongu, elev. 7200 ft, Western Highlands Province, Papua New Guinea, 15 Jun. 1963, H. Clissold, BBM-NG-28127 (BPBM); 1♂, 6♀, 1 nymph, Tomba, elev. 8000 ft, Western Highlands Province, Papua New Guinea, 25 May 1963, H. Clissold, BBM-NG-27934 (BPBM); 2♂, 4♀, Lake Louise, elev. 7800 ft, 17 miles WNW Telefomin, West Sepik Province, Papua New Guinea, 14 Apr. 1971, A.B. Mirza, BBM-NG-100043 (BPBM).

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.SA.), 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.

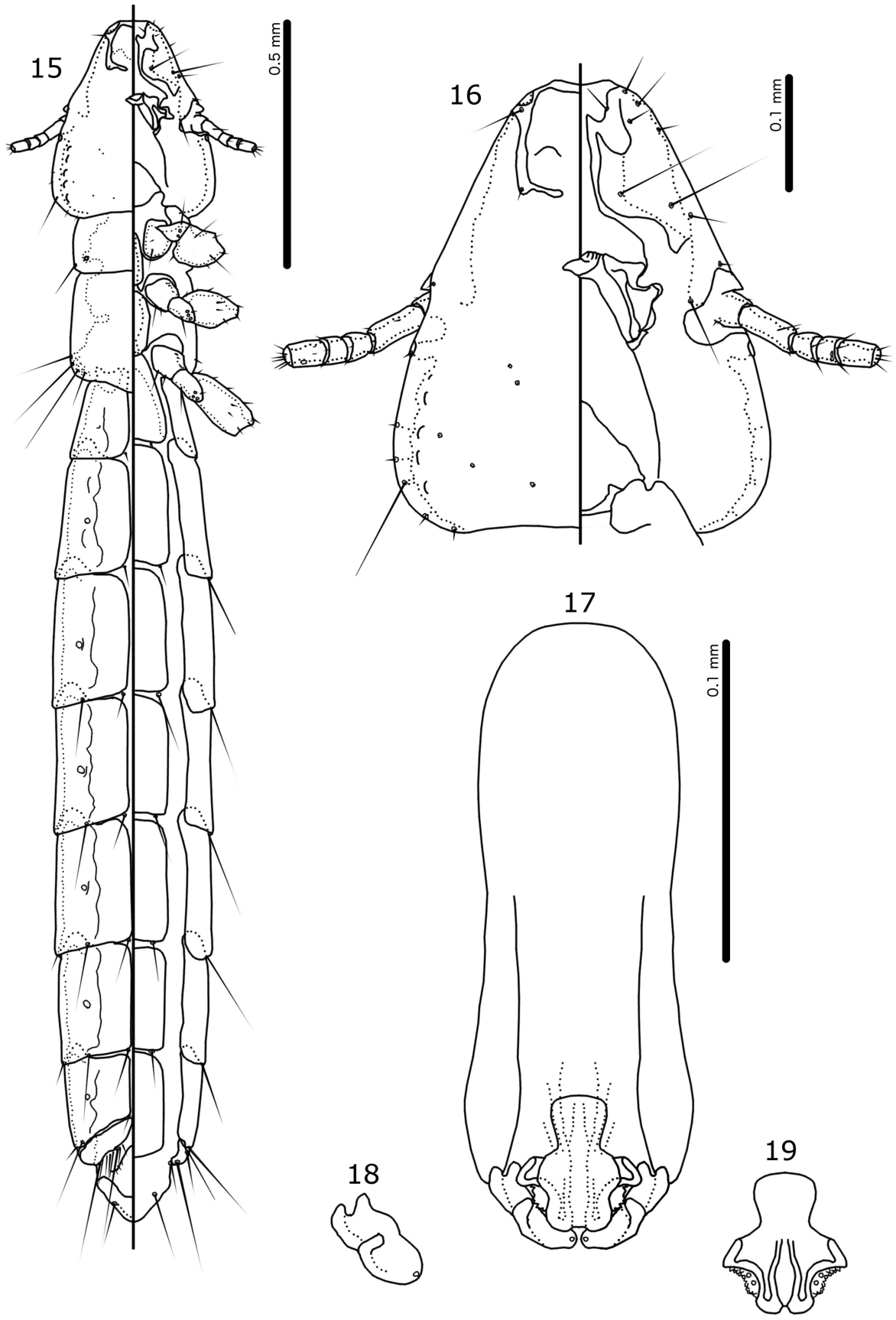
Aratricerca madagascariensis Gustafsson, Zou & Bush, new species
(Figs 15–19)

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, FMNHINS-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*).
Brueelia Kéler, 1936: 257 (*in partim*).
Turdinirmoides Gustafsson & Bush, 2017: 112.
Carpodaciella Mey, 2017: 170.
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.
Brueelia 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)

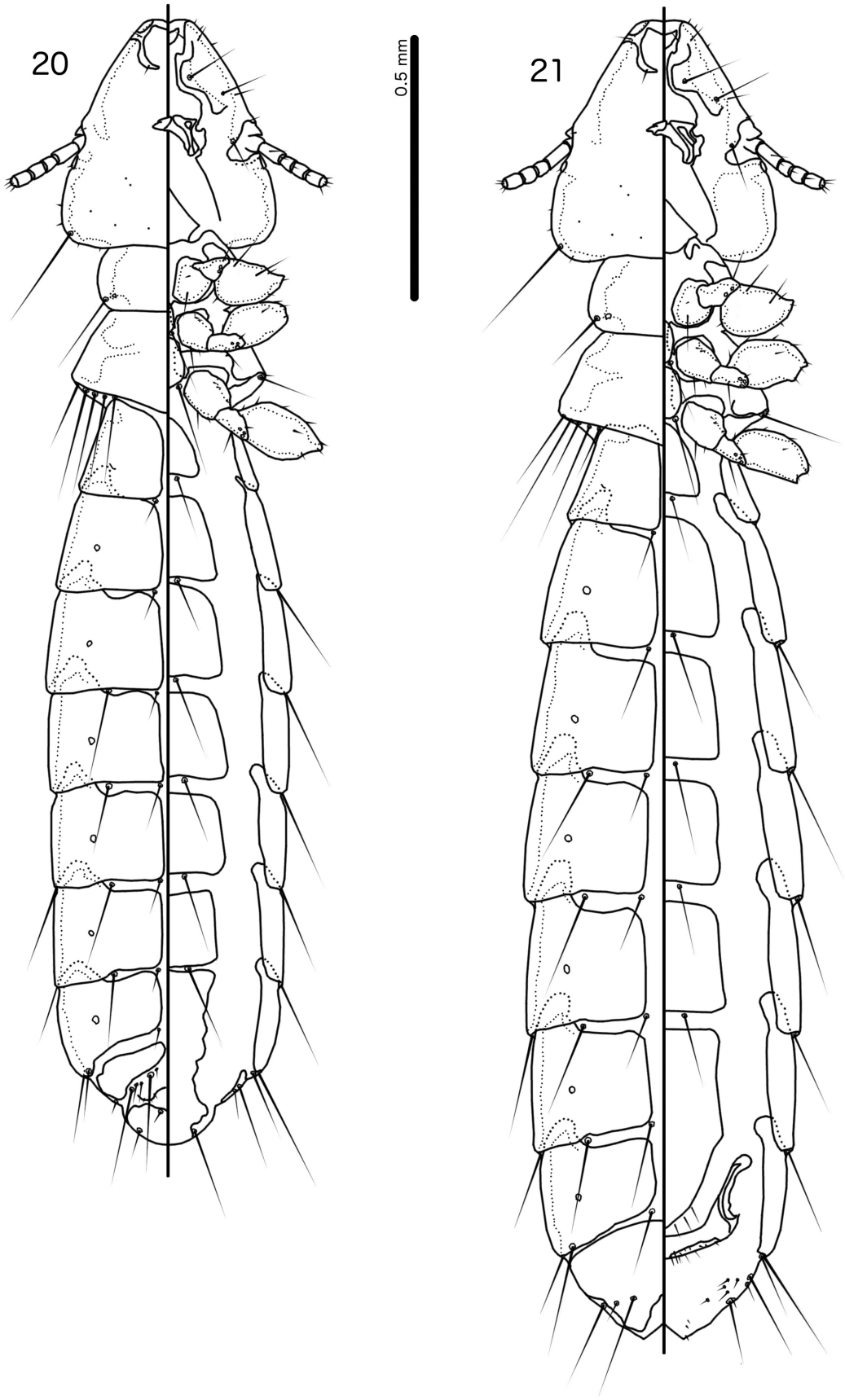
Type host. *Prunella collaris nipalensis* (Blyth, 1843)—alpine accentor (Prunellidae).

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

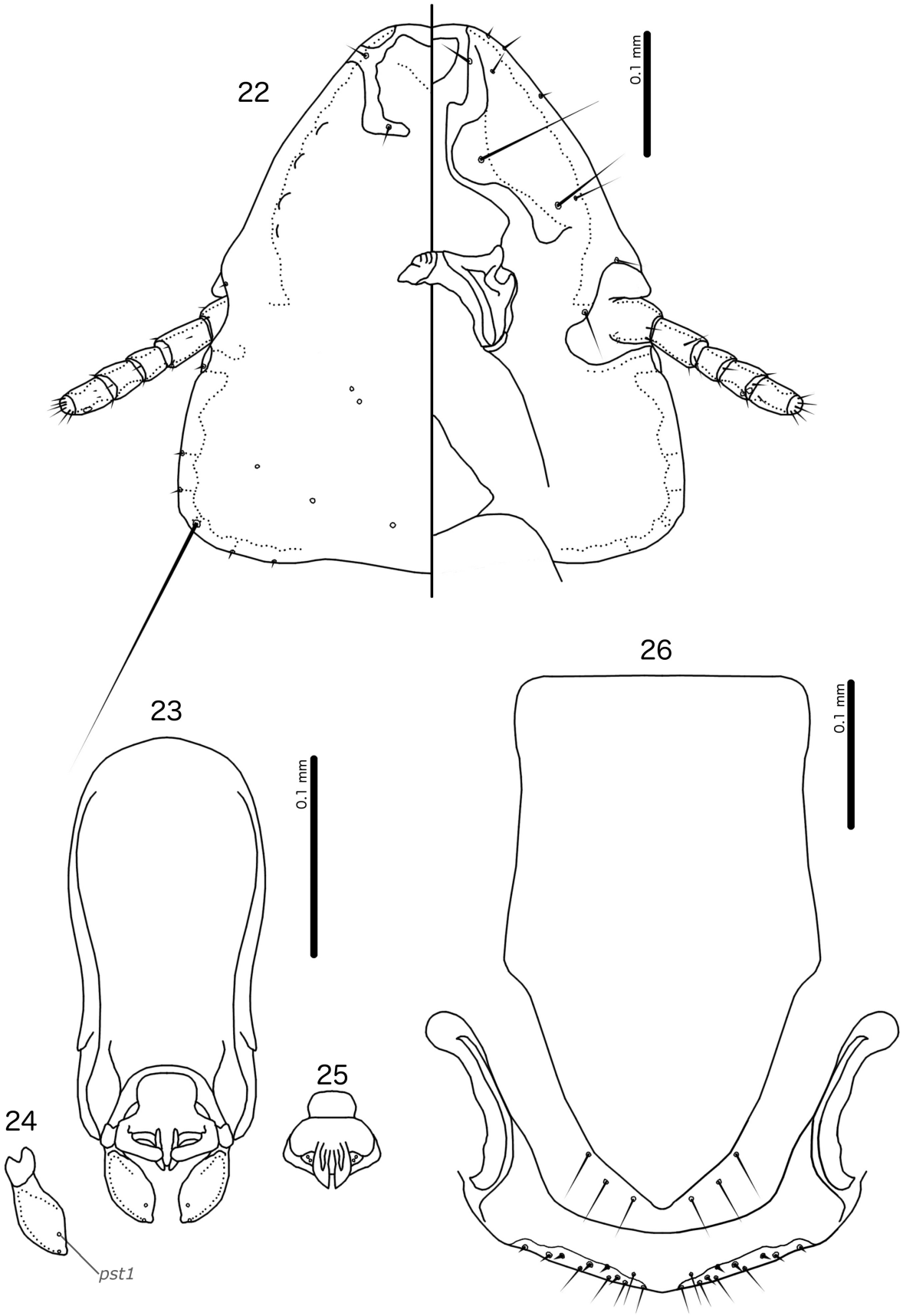
Type locality. Sakhuwasabha District, Nepal.

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 medianly 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 sinuous thickening medianly. 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.



FIGURES 22–26. *Turdinirmoides janigai* **n. sp. 22,** male head, dorsal and ventral views. **23,** male genitalia, dorsal view. **24,** male paramere, dorsal view. **25,** male mesosome, ventral view. **26,** female subgenital plate and vulva margin, ventral view. Abbreviation: *pst1—parameral seta 1*.

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; *pst2* 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♂, 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 & Kubašková 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

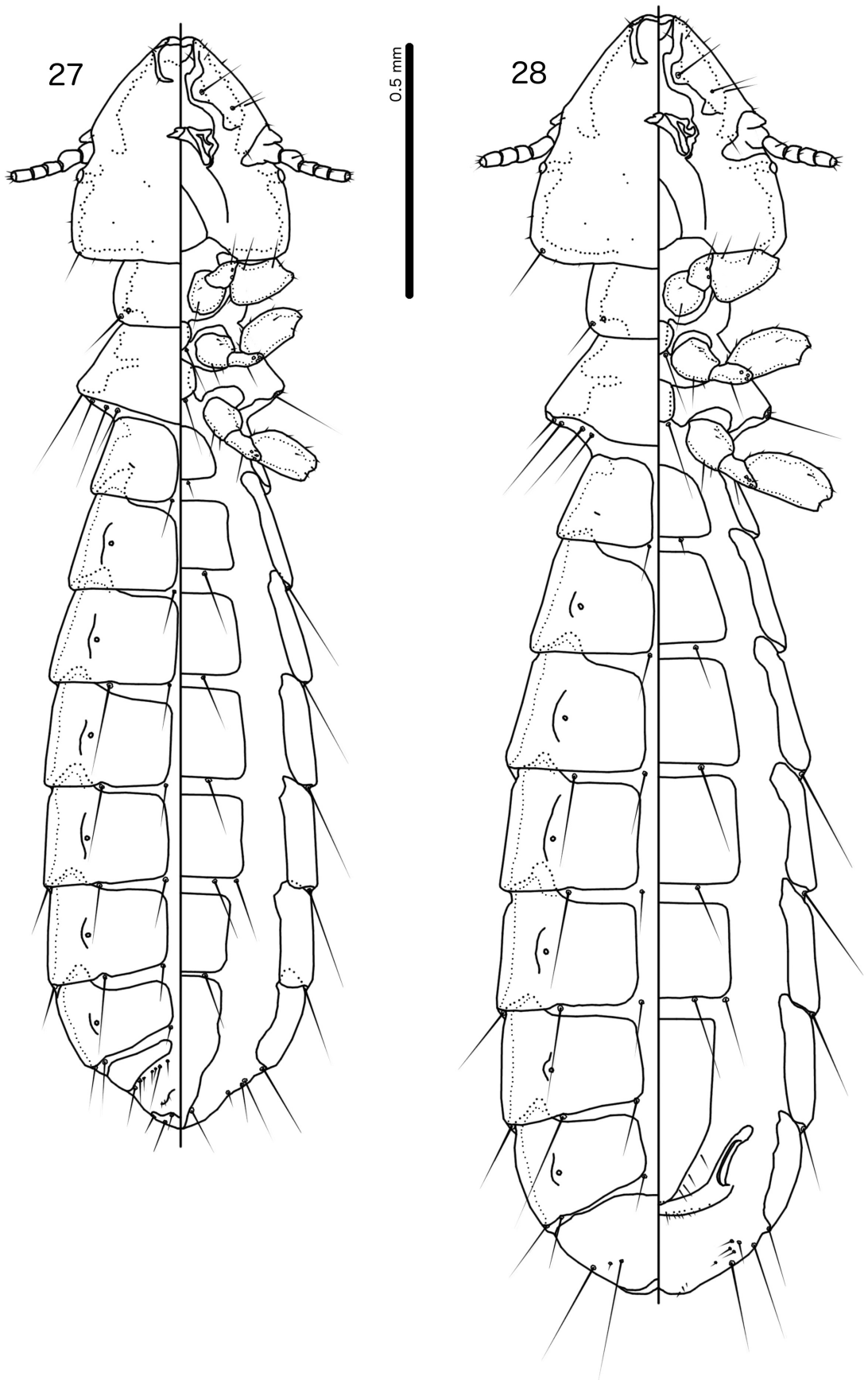
(Figs 27–33)

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

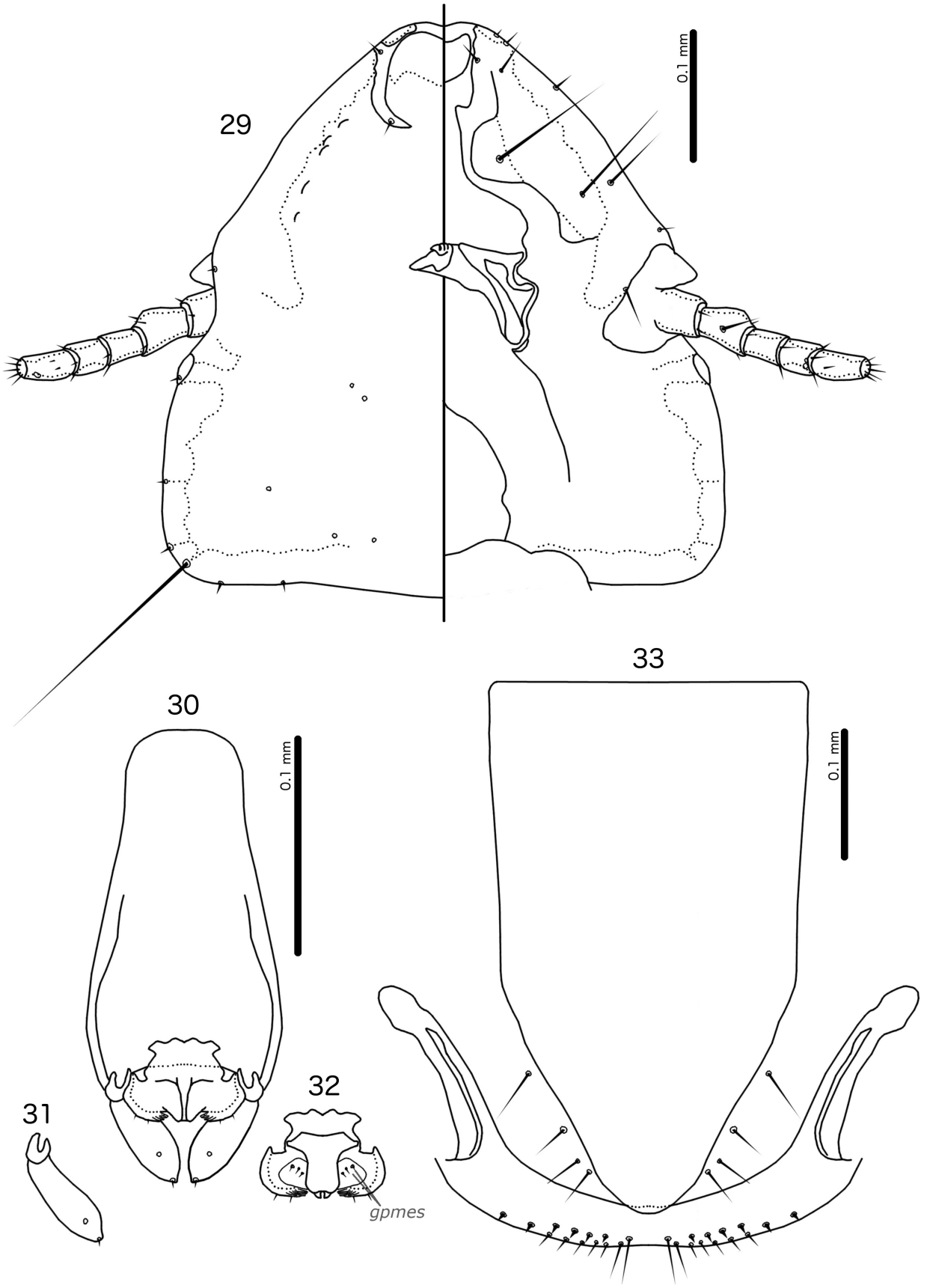
Type locality. Sakhuwasabha District, Nepal.

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

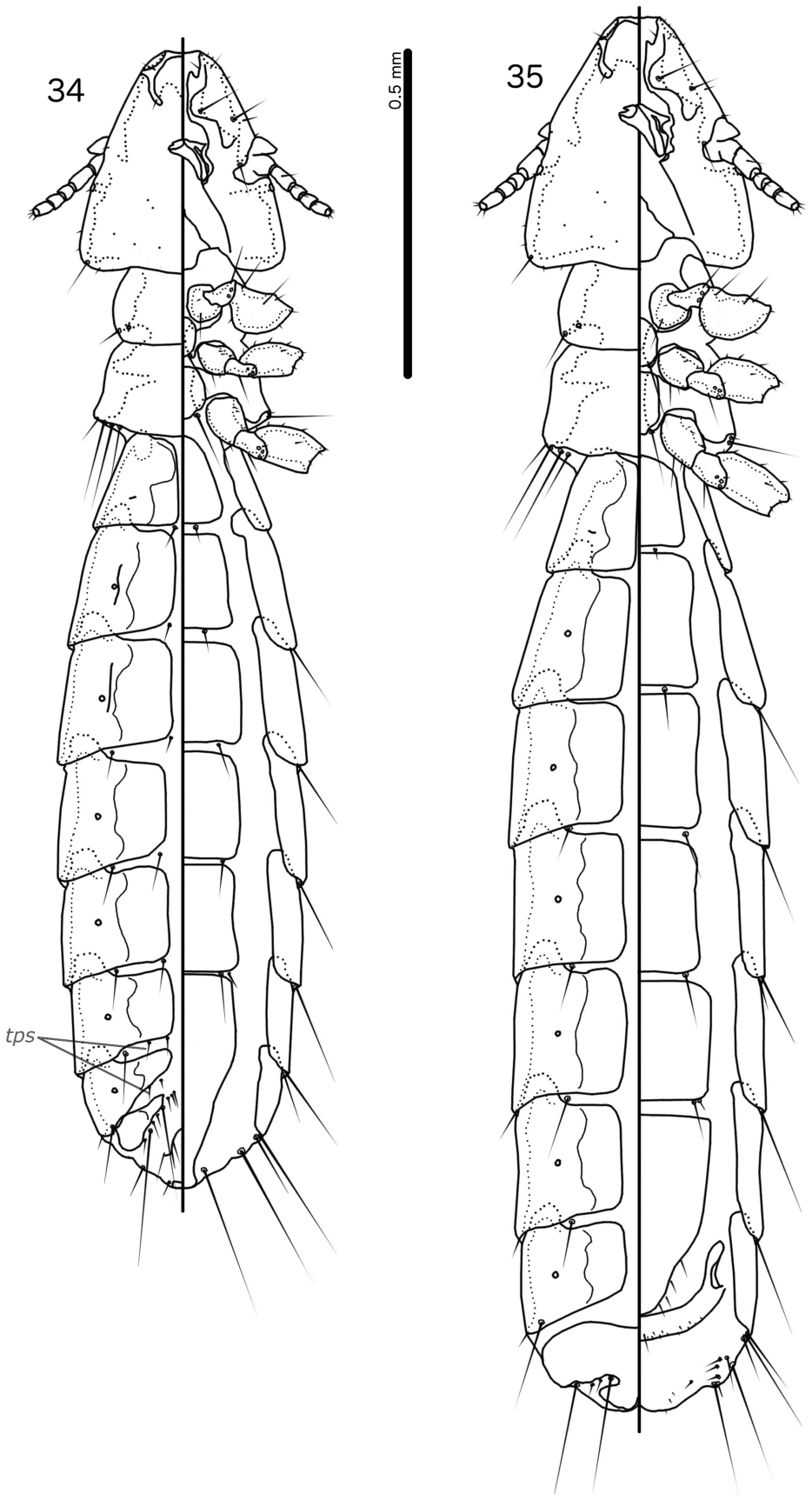
Description. *Both sexes.* Head subtriangular, broad and rounded (Fig. 29), with lateral margins of preantennal area convex, and frons shallowly concave medianly. Marginal carina interrupted laterally. Dorsal preantennal suture extends slightly median to *ads*. Dorsal anterior plate with sinuous thickening 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.



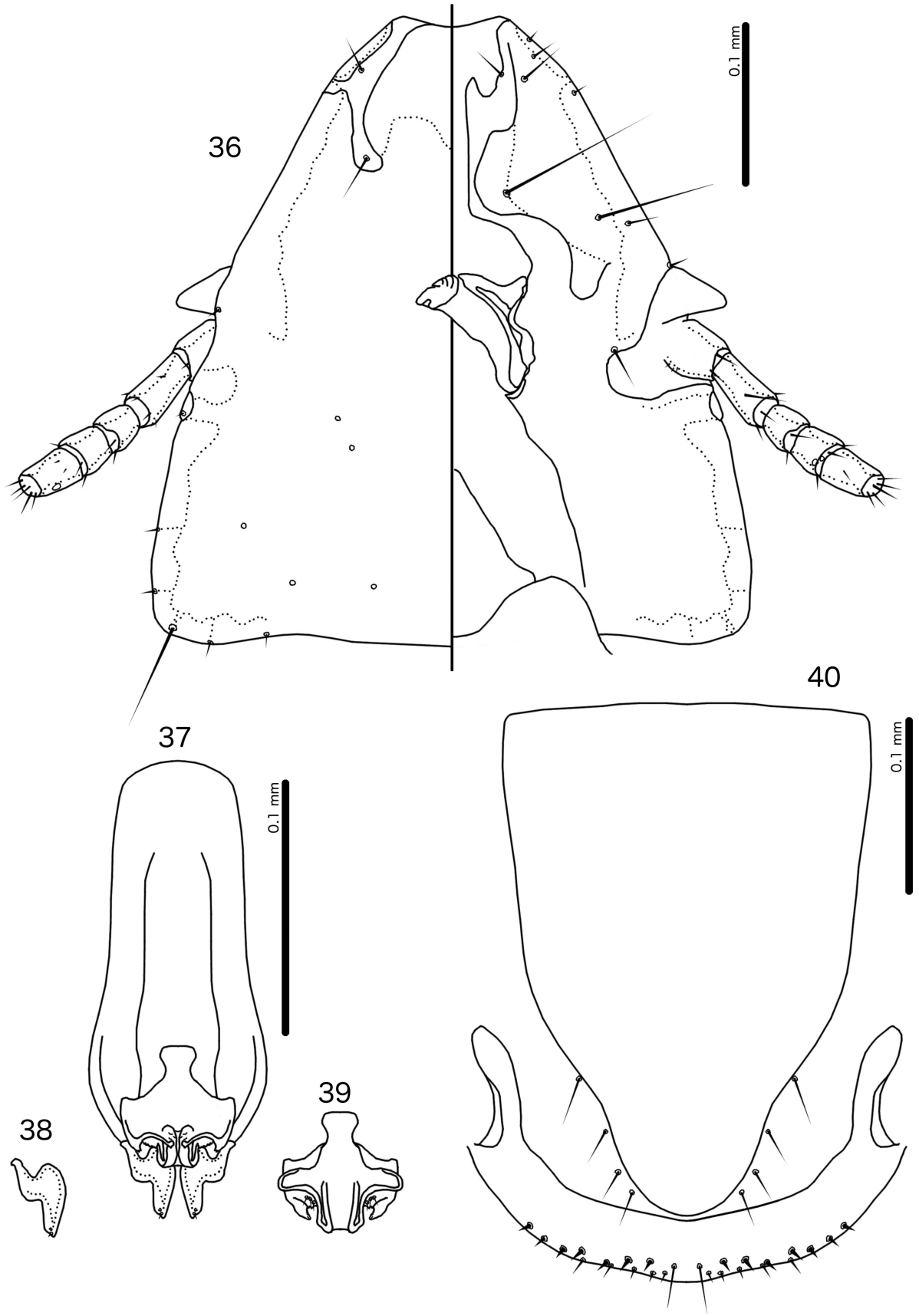
FIGURES 27–28. *Turdinirmoides rozsai* **n. sp. 27,** male habitus, dorsal and ventral views. **28,** female habitus, dorsal and ventral views.



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*).
Timalinirmus Mey, 2017: 170.
Type species: *Brueelia hrabali* Najer & Sychra [in Najer *et al*.], 2012. By original designation.

Included species
Timalinirmus hrabali (Najer & Sychra [in Najer *et al*.], 2012)
Brueelia hrabali Najer & Sychra [in Najer *et al*.], 2012: 65.
Turdinirmoides hrabali (Najer & Sychra [in Najer et al.], 2012); Gustafsson & Bush 2017: 114.
Timalinirmus hrabali (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 hrabali* by the following characters: head proportionately shorter and broader, especially in the temples, in *T. curvus* (Fig. 36) than in *T. hrabali*; male subgenital plate reaches distal end of abdomen in *T. curvus* (Fig. 34), but does not reach distal end of abdomen in *T. hrabali*; female tergopleurite XI much reduced in *T. hrabali*, 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. hrabali*; proximal mesosome with flat anterior margin in *T. curvus* (Fig. 39), but with pointed anterior margin in *T. hrabali*. Note that the male genitalia of *T. hrabali* 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 sinuous 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 *tps* 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. Mesosomal 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 *vms* on each side and 7 thorn-like *vss* on each side; *vss* longer than *vms*; 3–5 long, slender *vos* 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** ♂, Shiwandashan 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.

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

Note: We have not seen specimens of *Turdinirmoides carpodaci* and *Turdinirmoides 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 *Turdinirmoides 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 pterothorax 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; proximal mesosome widening anteriorly; distal margin of mesosome bulging, fringed; female sternite III with anterior thickening. . . . . *Aratricerca cirithra*
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 cerata*
- 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 medianly continuous posterior to dorsal anterior plate . . . . . 6.
- Dorsal preantennal suture medianly 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. 36); male subgenital plate not divided (Fig. 34); *sts* absent on male abdominal segment VII (Fig. 34) . . . . . .10.
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 abdominal segment VI (Fig. 20); *pst1* not close to *pst2* (Fig. 24) . . . . . 9.
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 with detached cross-piece (Fig. 33); detached cross-piece follows vulval margin for entire length (Fig. 33) . . . . . *Turdinirmoides rozsai*
- Female with 1 *ps* on each side of abdominal segment III (Fig. 21); proximal mesosome with smooth margins (Fig. 25); mesosomal lobes bluntly triangular, without hooks, fringes, or *lpmes* (Fig. 25); female subgenital plate not reaching detached cross-piece (Fig. 26); detached cross-piece reaches vulval margin only medianly and laterally (Fig. 26) . . . . . *Turdinirmoides janigai*
10. Male subgenital plate does not reach distal end of abdomen; female tergopleurite XI much reduced; proximal mesosome with pointed anterior margin . . . . . *Timalinirmus hrabali*
- Male subgenital plate reaches distal end of abdomen (Fig. 34); female tergopleurite XI large (Fig. 35); proximal mesosome with flat anterior margin (Fig. 39) . . . . . *Timalinirmus curvus*

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; Jønsson & 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 (*Indoceoplanetes, 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 is now 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.

Louse species	Host species	Geographical range of host	Host family
Aratricerca cerata **new species**	*Zosterops capensis* Sundevall, 1850	AT	Zosteropidae
Aratricerca cirithra Gustafsson & Bush, 2017	*Ptiloprora guisei guisei* (De Vis, 1894)	AP	Meliphagidae
Aratricerca macki **new species**	*Melidectes princeps* Mayr & Gilliard, 1951	AP	Meliphagidae
	Ptiloprora perstriata perstriata (De Vis, 1898)	AP	Meliphagidae
Aratricerca madagascariensis **new species**	*Randia pseudozosterops* Delacour & Berlioz, 1931	AT	Bernieridae
Ceratocista antennata (Ansari, 1956)	*Grammatoptila striata sikkimensis* (Ticehurst, 1924)	IM	Leiothrichidae
Indoceoplanetes (*Indoceoplanetes*) *indonesiana* (Eichler, 1947)	*Coracina striata difficilis* (Harter, 1895)	IM	Campephagidae
	Coracina striata panayensis (Steere, 1890)	IM	Campephagidae
	Coracina striata sumatrensis (Müller, 1843)	IM	Campephagidae
Indoceoplanetes (*Capnodella*) *laurocorythes* Gustafsson & Bush, 2017	*Edolisoma holopolium holopolium* (Sharpe, 1888)	AP	Campephagidae
Indoceoplanetes (*Capnodella*) *loboccupatrix* Gustafsson & Bush, 2017	*Lobotos oriolinus* Bates, 1909	AT	Campephagidae
Maculinirmus ljosalfar Gustafsson & Bush, 2017	*Oriolus chinensis diffusus* Sharpe, 1877	IM	Oriolidae
Maculinirmus mundus (Nitzsch [in Giebel], 1866)	*Oriolus oriolus oriolus* (Linnaeus, 1758)	AT, IM, PA	Oriolidae
Maculinirmus novaehollandiae (Mey, 2017)	*Cinclosoma punctatum punctatum* (Shaw, 1794)	AP	Cinclosomatidae
Resartor albofulvus Gustafsson *et al*., 2018	*Heterophasia desgodinsi desgodinsi* (Oustalet, 1877)	IM	Leiothrichidae
Resartor apimimus Gustafsson *et al*., 2018	*Heterophasia picaoides wrayi* (Ogilvie-Grant, 1910)	IM	Leiothrichidae
Resartor aterrimus Gustafsson *et al.,* 2018	*Minla ignotincta mariae* La Touche, 1921	IM	Leiothrichidae
Resartor effronte (Ansari, 1956)	*Trochalopteron squamatum* (Gould, 1835)	IM	Leiothrichidae
Resartor elugeus Gustafsson *et al.*, 2021	*Alcippe fratercula yunnanensis* Harington, 1913	IM	Leiothrichidae
Resartor extraneus Gustafsson *et al*., 2018	*Lioparus chrysotis swinhoii* (Verreaux, 1871)	IM	Sylviidae
Resartor grammatoptiliphaga (Mey, 2017)	*Grammatoptila striata sikkimensis* (Ticehurst, 1924)	IM	Leiothrichidae
Resartor guangxiensis Gustafsson *et al.,* 2018	*Trochalopteron milnei sinianum* Stresemann, 1930	IM	Leiothrichidae
Resartor himalayana (Mey, 2017)	*Trochalopteron affine blythi* Verreaux, 1871	IM	Leiothrichidae
Resartor impressifrons (Ansari, 1956)	*Trochalopteron affine affine* (Blyth, 1843)	IM	Leiothrichidae
	Trochalopteron affine bethelae (Rand & Flemming, 1956)	IM	Leiothrichidae

.....continued on the next page

TABLE 2. (Continued)

Louse species	Host species	Geographical range of host	Host family
Resartor longisuturalis Gustafsson *et al*., 2018	*Actinodura cyanouroptera wingatei* (Ogilvie-Grant, 1900)	IM	Leiothrichidae
Resartor novofacies (Ansari, 1956)	*Trochalopteron subunicolor subunicolor* (Blyth, 1843)	IM	Leiothrichidae
Resartor seminudus Gustafsson *et al*., 2018	*Leiothrix argentauris tahanensis* (Yen, 1934)	IM	Leiothrichidae
Resartor weigoldi (Mey, 2017)	*Trochalopteron formosum formosum* Verreuax, 1869	IM	Leiothrichidae
Timalinirmus hrabali (Najer & Sychra [in Najer *et al.*], 2012)	*Mixornis gularis* (Horsfield, 1822)	IM	Timaliidae
Timalinirmus curvus **new species**	*Yuhina castaniceps plumbeiceps* (Godwin-Austen, 1877)	IM	Zosteropidae
Titanomessor sexloba Gustafsson & Bush, 2017	*Laniarius erythrogaster* (Cretzschmar, 1829)	AT	Malaconotidae
Turdinirmoides carpodaci (Mey, 2017)	*Carpodacus rubicilla kobdensis* (Sushkin, 1925)	PA	Fringillidae
Turdinirmoides grandalae (Clay, 1936)	*Grandala coelicolor* Hodgson, 1843	IM, PA	Muscicapidae
Turdinirmoides janigai **new species**	*Prunella collaris fennelli* Deignan, 1964	IM	Prunellidae
	Prunella collaris nipalensis (Blyth, 1843)	PA	Prunellidae
Turdinirmoides rozsai **new species**	*Carpodacus subhimachala* (Hodgson, 1836)	IM, PA	Fringillidae
Turdinirmoides vasjukovae (Mey, 2017)	*Uragus sibiricus sibiricus* (Pallas, 1773)	PA	Fringillidae
Turdinirmus australissimus Gustafsson & Bush, 2017	*Zoothera lunulata lunulata* (Latham, 1802)	AP	Turdidae
Turdinirmus daumae (Clay, 1936)	*Zoothera aurea* (Holandre, 1825)	IM, PA	Turdidae
	Zoothera dauma dauma (Latham, 1790)	IM, PA	Turdidae
Turdinirmus eichleri Mey, 1982	*Turdus obscurus* Gmelin, 1789	PA	Turdidae
Turdinirmus merulensis (Denny, 1842)*	*Turdus mandarinus* Bonaparte, 1850	IM, PA	Turdidae
	Turdus merula aterrimus (Madarasz, 1903)	PA	Turdidae
	Turdus merula azorensis Hartert, 1905	PA	Turdidae
	Turdus merula merula Linnaeus, 1758	PA	Turdidae
	Turdus merula syriacus Hemprich & Ehrenberg, 1833	PA	Turdidae
	Turdus pallidus Gmelin, 1789	PA	Turdidae
	Turdus philomelos philomelos Brehm, 1831	PA	Turdidae
Turdinirmus stresemanni (Clay, 1936)	*Zoothera monticola monticola* Vigors, 1832	IM, PA	Turdidae
Turdinirmus zootherae (Clay, 1936)	*Zoothera marginata* Blyth, 1847	IM, PA	Turdidae

*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*).

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