

1 **FIVE NEW SPECIES OF *GUIMARAESIELLA* (PHTHIRAPTERA:**
2 **ISCHNOCERA) FROM BROADBILLS (AVES: PASSERIFORMES:**
3 **CALYPTOMENIDAE, EURYLAIMIDAE)**

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20 **Abstract:** Five new species of *Guimaraesiella* Eichler, 1949, are described and
21 illustrated from hosts in the Eurylaimidae and Calyptomenidae. They are: *Guimaraesiella*
22 *khlongkhlungensis* **n. sp.** from *Corydon sumatranus laoensis* Meyer de Schauensee,
23 1929; *Guimaraesiella latirostris* **n. sp.** from *Eurylaimus ochromalus* Raffles, 1822;

24 *Guimaraesiella cyanophoba* **n. sp.** from *Cymbirhynchus macrorhynchus malaccensis*
25 Salvadori, 1874 and *C. m. siamensis* Meyer de Schauensee & Ripley, 1940;
26 *Guimaraesiella altunai* **n. sp.** from *Calyptomena viridis caudacuta* Swainson, 1838;
27 *Guimaraesiella forcipata* **n. sp.** from *Eurylaimus steerii steerii* Sharpe, 1876. These
28 represent the first species of *Guimaraesiella* described from the Calyptomenidae and
29 Eurylaimidae, as well as the first species of this genus described from the Old World
30 suboscines.

31 **KEY WORDS:** Phthiraptera, Ischnocera, Philopteridae, *Brueelia*-complex,
32 *Guimaraesiella*, Eurylaimidae, Calyptomenidae, broadbill, new species

33 Ischnoceran chewing lice belonging to the *Brueelia*-complex are widely distributed
34 across the oscine passeriforms (Gustafsson & Bush, 2017). By contrast, suboscine
35 passeriforms are generally parasitized either by lice belonging to other complexes (*e.g.*
36 the *Rallicola*- or *Degeeriella*-complexes; Carriker, 1956; Somadder and Tandan, 1977;
37 summarized in Table 1) or by lice belonging to genera closely related to the *Brueelia*-
38 complex (Bush et al., 2016), but not part of this complex as defined by Gustafsson &
39 Bush (2017). Most of the chewing louse genera occurring on suboscine hosts are not
40 known from hosts in other groups. For instance, the genus *Debeauxoecus* Conci, 1941 is
41 only known from hosts in the Pittidae, and the genera *Furnaricola* Carriker, 1944,
42 *Furnariphilus* Price and Clayton, 1995, *Formicaricola* Carriker, 1957, and
43 *Formicaphagus* Carriker, 1957, are all known only from New World suboscines. In
44 general, oscine and suboscine passeriforms are thus parasitized by lice belonging to
45 different groups, reflecting the basal division between the oscines and the suboscines
46 within Passeriformes (Barker et al. 2004).

47 The principal exception to this general rule are the few species of *Brueelia* Kéler,
48 1936, and *Guimaraesiella* Eichler, 1949, known from a small number of furnariid and
49 tyrannid hosts (*e.g.* Carriker, 1963; Cicchino, 1981, 1983). These are all typical
50 representatives of their respective genera, and may be derived from comparatively recent
51 host switches from oscine to suboscine hosts. Moreover, Gustafsson & Bush (2017)
52 described the genus *Psammonirmus* for a single *Brueelia*-complex species from a
53 eurylaimid host, *Serilophus lunatus* (Gould, 1834). No representative of this species was
54 included in the phylogeny of the *Brueelia*-complex of Bush et al. (2016), and the genus is
55 not morphologically close to any other genus in this complex, and thus hard to place.

56 We here describe five additional species of chewing lice from the Eurylaimidae
57 and the Calyptomenidae that challenge this general pattern. All five species are typical
58 members of *Guimaraesiella* Eichler, 1949, and are morphologically similar to the type
59 species of the genus, *Guimaraesiella papuana* (Giebel, 1879).

60

61 **MATERIAL AND METHODS**

62 Examined specimens are deposited in the Berenice Pauahi Bishop Museum, Honolulu,
63 Hawaii (BPBM), Natural History Museum, London, United Kingdom (NHML),
64 Oklahoma State University, Stillwater, Oklahoma (OSUS), University of Minnesota, St.
65 Paul, Minnesota (UMSP), Zoological Institute of Russian Academy of Sciences (ZIN) as
66 indicated below under each species. All specimens are slide-mounted in Canada balsam.
67 Drawings were done through a drawing tube, and edited in GIMP (www.gimp.org).

68 Terminology and abbreviations for setal, structural and genitalic characters follow
69 Gustafsson and Bush (2017). Measurements (Table 2) are given in millimeters for the

70 following dimensions: TL = total length (along midline); HL = head length (along
71 midline); HW = head width (at temples); PRW = prothoracic width; PTW = pterothoracic
72 width; AW = abdominal width (at segment V). Host taxonomy follows Clements et al.
73 (2018).

74

75 **DESCRIPTION**

76 **PHTHIRAPTERA Haeckel, 1896**

77 **Ischnocera Kellogg, 1896**

78 **Phlopteridae Burmeister, 1838**

79 **The *Brueelia*-complex**

80 ***Guimaraesiella* Eichler, 1949**

81 *Nirmus* Nitzsch, 1818: 291 (*in partim*).

82 *Degeeriella* Neumann, 1906: 60 (*in partim*).

83 *Brueelia* Kéler, 1936: 257 (*in partim*).

84 *Xobugirado* Eichler 1949: 13.

85 *Allobrueelia* Eichler, 1951: 36 (*in partim*).

86 *Allobrueelia* Eichler, 1952: 74 (near-verbatim redescription).

87 *Allonirmus* Złotorzycka, 1964: 263.

88 *Nitzschnirmus* Mey & Barker, 2014: 101.

89 *Callaenirmus* Mey, 2017: 92.

90 *Philemoniellus* Mey, 2017: 145.

91 **Type species.** *Docophorus subalbicans* Piaget, 1885: 6 [= *Docophorus papuanus* Giebel,
92 1879: 475], by original designation.

93 **Remarks.** Gustafsson et al. (2019a) recently described the subgenus
94 *Guimaraesiella* (*Cicchinella*) for species of *Guimaraesiella* parasitizing babblers. All
95 species described here are members of the nominal subgenus, *Guimaraesiella*
96 (*Guimaraesiella*). Within this subgenus, we here establish an informal “core
97 *Guimaraesiella*” group, which consists of all those species found in clade A-1 of the
98 phylogeny of Bush et al. (2016; fig. 3), as well as those more closely related to this group
99 than to other groups within *Guimaraesiella*. All species described here are part of this
100 “core” *Guimaraesiella* group.

101 Morphological characterization of this group is difficult, due to high variation in
102 many characters. However, typical members of this group are similar to the type species
103 [*G. papuana* (Giebel, 1874)], which was redescribed and illustrated by Gustafsson and
104 Bush (2017; 224–231, figs 354–360). In particular, the following characters are typical
105 for this group: dorsal preantennal suture does not separate dorsal anterior plate; female
106 subgenital plate lacks complete cross-piece (but may have lateral submarginal bulges or
107 extensions); ventral sclerite of mesosome with single anterior extension; gonopore
108 terminal; mesosome without rugose nodi.

109 The only described Southeast Asian species of “core” *Guimaraesiella* that have at
110 least slightly concave lateral margins of the preantennal area are *Guimaraesiella papuana*
111 (Giebel, 1879), *G. cucphuongensis* (Najer [in Najer et al.] 2012), and *Guimaraesiella*
112 *wallacei* (Mey and Barker, 2014); *Olivinirmus borneensis* Mey, 2017, may also belong to
113 this group, but its generic position cannot be determined unambiguously from the original
114 description. None of these species are particularly similar morphologically to the species
115 treated here; for instance, with the exception of *G. papuana* all these species have shorter

116 and blunter preantennal areas. *Guimaraesiella papuana* can be separated from all species
117 described here by the much simpler structure of the male mesosome and by the absence
118 in *G. papuana* of *ps* on male abdominal segment IV (see Gustafsson and Bush, 2017).

119 The genus *Guimaraesiella* is in great need of revision, and the majority of the
120 morphological variation we have seen within this genus is in undescribed species. We
121 therefore do not presently give this group a formal name. More detailed examinations of
122 the variation and relationships within this genus are in preparation, and we therefore do
123 not provide a complete list of species included in the “core” group here. Further examples
124 of the morphological variation within this “core” group can be found in Gustafsson et al.
125 2019b.

126

127 ***Guimaraesiella khlongklungensis* n. sp.**

128

(Figs 1–7)

129 **Description** *Both sexes*: Head broadly trapezoidal (Fig. 3), lateral margins of preantennal
130 head slightly concave, frons broadly concave. Marginal carina of moderate, irregular,
131 width, interrupted laterally and submedianly. Dorsal preantennal carina reaching *dsms*,
132 *ads*, and lateral head margins, extending slightly median to *ads*. Ventral anterior plate
133 somewhat elongated. Dorsal anterior plate not separate, longer than wide. Head
134 chaetotaxy as in Fig. 3. Preantennal nodi moderate, bulging. Preocular nodi much larger
135 than minute postocular nodi. Marginal temporal carina narrow, of even width. Gular plate
136 broadly with median point. Thoracic and abdominal segments as in Figs 1–2. Leg seta *fl*-
137 *v4* absent.

138 *Male*: Thoracic and abdominal chaetotaxy as in Fig. 1; *ps* present on segment III; *aps*
139 present on tergopleurite IV in some specimens, but not illustrated here; *aps* present on
140 tergopleurite V; tergopleurite VIII with three setae on each side (not counting
141 trichobothrium). Basal apodeme with slightly concave lateral margins (Fig. 4). Proximal
142 mesosome substantially overlapping basal apodeme, anterior margin flat, antero-lateral
143 corners with blunt hooks. Ventral sclerite with one anterior extension; chaetotaxy as in
144 Fig. 5. Distal mesosome without noticeable lateral lobes, lateral margins almost parallel.
145 Gonopore roughly quadratic, lateral margins serrated. Parameral heads rounded;
146 parameral blades short, convergent, distal ends slightly elongated; *pst1–2* as in Fig. 6.
147 *Female*: Thoracic and abdominal chaetotaxy as in Fig. 2; abdominal segment III with 1
148 *ps* on each side. Vulval margin (Fig. 7) slightly convex. Subgenital plate broad distally,
149 with narrow submarginal bulges; 0–4 short, slender *vms* and 4–6 short, thorn-like *vss* on
150 each side; 3–5 short, slender *vos* on each side of subgenital plate, the most distal *vos*
151 median to *vss*.

152 **Taxonomic summary**

153 *Type host*: *Corydon sumatranus laoensis* Meyer de Schauensee, 1929 – dusky broadbill.

154 *Type locality*: Ban Hua Thanon, Khlong Khlung, Kamphaeng-Phet, Thailand.

155 *Specimens deposited*: **Holotype** ♂, Ban Hua Thanon, Khlong Khlung, Kamphaeng-Phet,
156 Thailand, 3 Apr. 1953, R.E. Elbel & H.G. Deignan, RE-2357, RT-B-17855 (OSUS).

157 **Paratypes**. 3♂, 4♀, same data as holotype (OSUS).

158 *Etymology*: The specific epithet is derived from the type locality.

159 *ZooBank registration*:

160 **Remarks.** *Guimaraesiella khlongkhlungensis* **n. sp.** is most similar to *G. altunai* **n. sp.**
161 and *G. latirostris* **n. sp.**, with which it shares the following characters: preantennal area
162 broad (Figs 3, 10, 24); *aps* present on male tergopleurite V (Figs 1, 8, 22); proximal
163 mesosome substantially overlapping with basal apodeme (Figs 4, 11, 25). *Guimaraesiella*
164 *khlongkhlungensis* can be separated from both of these species by the following
165 characters: *ps* present on male abdominal segment III in *G. khlongkhlungensis* (Fig. 1),
166 but absent in *G. latirostris* (Fig. 8) and *G. altunai* (Fig. 22); male tergopleurite VIII with
167 three posterior setae on each side, not counting trichobothrium (Fig. 1), but with only two
168 setae on each side in *G. latirostris* (Fig. 8) and *G. altunai* (Fig. 22); *ps* present on female
169 abdominal segment III in *G. khlongkhlungensis* (Fig. 2), but absent in *G. latirostris* (Fig.
170 9) and *G. altunai* (Fig. 23); proximal mesosome with flat anterior margin and bluntly
171 hooked antero-lateral corners in *G. khlongkhlungensis* (Fig. 5), but with convergent
172 anterior margin and rounded antero-lateral corners in *G. latirostris* (Fig. 12) and *G.*
173 *altunai* (Fig. 26).

174

175 ***Guimaraesiella latirostris* n. sp.**

176

(Figs 8–14)

177 **Description** *Both sexes:* Head broadly trapezoidal (Fig. 10), lateral margins of
178 preantennal head convex posteriorly and slightly concave anteriorly, frons broadly
179 concave. Marginal carina of broad, of irregular width, interrupted laterally and
180 submedianly. Dorsal preantennal carina reaching *dsms*, *ads*, and lateral head margins, not
181 extending median to *ads*. Ventral anterior plate roughly trapezoidal. Dorsal anterior plate
182 not separate, longer than wide. Head chaetotaxy as in Fig. 10. Preantennal nodi large,

183 bulging. Preocular nodi much larger than minute postocular nodi. Marginal temporal
184 carina very narrow, of even width. Gular plate with median point. Thoracic and
185 abdominal segments as in Figs 8–9. Leg seta *fl-v4* absent.

186 *Male:* Thoracic and abdominal chaetotaxy as in Fig. 8; *ps* absent on abdominal segment
187 III; *aps* present on tergopleurite V; tergopleurite VIII with two setae on each side (not
188 counting trichobothrium). Basal apodeme broad, with slightly concave lateral margins
189 (Fig. 11). Proximal mesosome substantially overlapping basal apodeme, rounded to
190 median point (more pronounced than illustrated here in some specimens), with rounded
191 antero-lateral corners. Distal mesosome with gently rounded margins, mesosomal lobes
192 not noticeable. Ventral sclerite with single anterior extension, almost reaching anterior
193 margin of mesosome (Fig. 12) and small rugose area medianly near distal margin;
194 chaetotaxy as in Fig. 12. Gonopore displaced anteriorly, roughly rounded in outline,
195 lateral margins serrated. Parameral heads with medio-posterior angle; parameral blades
196 short, slender; *pst1–2* as in Fig. 13.

197 *Female:* Thoracic and abdominal chaetotaxy as in Fig. 9; *ps* absent on abdominal
198 segment III. Distal subgenital plate poorly visible in examined specimens, and here
199 illustrated approximately; submarginal extensions likely more slender than illustrated;
200 distal end broad (Fig. 14). Vulval margin gently rounded, slightly flattened medianly,
201 with 3 short, slender *vms* and 5–7 short, thorn-like *vss* on each side; 4–6 short, slender *vos*
202 on each side of subgenital plate; distal 1–2 *vos* median to *vss*.

203 **Taxonomic summary**

204 *Type host:* *Eurylaimus ochromalus* Raffles, 1822 – black-and-yellow broadbill.

205 *Type locality:* Khao Phappa, Banna, Phatthalung, Thailand.

206 *Material deposited:* **Holotype** ♂, Khao Phappa, Banna, Phatthalung [as Phatalung],
207 Thailand, 20 Aug. 1955, B. Lekagul, SE2591 [marked with black dot on slide] (BPBM).

208 **Paratypes.** 5♂, 4♀, same data as holotype (BPBM).

209 *Etymology:* The specific name is derived from Latin “*lata*” for “broad” and “*rostres*” for
210 “beak”, referring to the broad preantennal area of this species.

211 *ZooBank registration:*

212 **Remarks** Host identification is uncertain on the slide labels; we tentatively accept the
213 given host as the type host.

214 *Guimaraesiella latirostris* **n. sp.** is most similar to *G. altunai* **n. sp.**, with which it
215 shares the following characters: *aps* present on male tergopleurite V (Figs 8, 22); *ps*
216 absent on male abdominal segment III (Figs 8, 22); male tergopleurite VIII with two
217 posterior setae on each side (not counting trichobothrium; Figs 8, 22); female abdominal
218 segment IV with two *ps* on each side (Figs 9, 23); proximal mesosome convergent to
219 median point (Figs 12, 26). These two species can be separated by the following
220 characters: preantennal area proportionately shorter and broader in *G. latirostris* (Fig. 10)
221 than in *G. altunai* (Fig. 24); ventral sclerite of male mesosome almost reaches anterior
222 margin of mesosome in *G. latirostris* (Fig. 12), but not in *G. altunai* (Fig. 26); lateral
223 margins of mesosome gently rounded in *G. latirostris* (Fig. 12), but with distinct bulge at
224 mid-length in *G. altunai* (Fig. 26); distal margin of ventral sclerite rugose in *G. latirostris*
225 (Fig. 12), but not in *G. altunai* (Fig. 26); gonopore more rounded in outline and situated
226 farther anterior in *G. latirostris* (Fig. 12) than in *G. altunai* (Fig. 26). Females best
227 separated on head shape, as vulval chaetotaxy overlaps between the two species.

228

229 *Guimaraesiella cyanophoba* n. sp.

230 (Figs 15–21)

231 **Description** *Both sexes*: Head broadly trapezoidal (Fig. 17), lateral margins of
232 preantennal head slightly concave, frons broadly concave. Marginal carina of moderate,
233 irregular, width, interrupted laterally and submedianly. Dorsal preantennal carina
234 reaching *dsms*, *ads*, and lateral head margins. Ventral anterior plate large, rounded
235 triangular. Dorsal anterior plate not separate, longer than wide. Head chaetotaxy as in Fig.
236 17. Preantennal nodi large, bulging. Preocular nodi much larger than minute postocular
237 nodi. Marginal temporal carina very narrow, of even width. Gular plate with median
238 point. Thoracic and abdominal segments as in Figs 15–16. Leg seta *fl-v4* absent.

239 *Male*: Thoracic and abdominal chaetotaxy as in Fig. 15; posterior margin of
240 mesometathorax normally with 5–6 setae on each side, but in one specimen with 9 setae
241 on each side; *ps* absent on abdominal segment III; *aps* absent in tergopleurites IV–V;
242 tergopleurite VIII with 2 setae on each side (not counting trichobothrium). Anterior end
243 of basal apodeme not clearly visible in examined specimens; lateral margins more or less
244 parallel, but bulging proximally (Fig. 18). Proximal mesosome substantially overlapping
245 with basal apodeme (Fig. 18); anterior margin roughly flat, antero-lateral corners with
246 slight rectangular bulges (exact shape differs between specimens). Ventral sclerite with
247 single anterior extension not reaching near anterior margin of mesosome; distal end not
248 rugose; chaetotaxy as in Fig. 19. Distal mesosome with convex mesosomal lobes.
249 Gonopore roughly quadratic in outline, antero-median part slightly rugose, lateral
250 margins serrated. Parameral heads with several small bulges (Fig. 20); parameral blades
251 short, stout; *pst1–2* as in Fig. 20.

252 *Female*: Thoracic and abdominal chaetotaxy as in Fig. 16; posterior margin of
253 mesometathorax with 5–7 setae on each side; *ps* absent on abdominal segment III.
254 Subgenital plate broad distally, with slender submarginal extensions (Fig. 21). Vulval
255 margin gently rounded, with 3–4 short, slender *vms* and 4–8 short, thorn-like *vss* on each
256 side; 6–8 short, slender *vos* on each side of subgenital plate; 1–2 distal *vos* median to *vss*.

257 **Taxonomic summary**

258 *Type host*: *Cymbirhynchus macrorhynchus malaccensis* Salvadori, 1874 – black-and-red
259 broadbill.

260 *Type locality*: Thung Nui, Satun, Thailand.

261 *Other host*: *Cymbirhynchus macrorhynchus siamensis* Meyer de Schauensee & Ripley,
262 1940 – black-and-red broadbill.

263 *Specimens deposited*: Ex *Cymbirhynchus macrorhynchus malaccensis*: **Holotype** ♂,

264 Thung Nui, Satun, Thailand, 1 Sep. 1963, W. Songprakob & W.S. Laong, WS459

265 [marked with black dot on slide] (BPBM). **Paratypes**. 2♂, 1♀, same data as holotype

266 (BPBM); 4♂, 12♀, Muang Kluang, Kapoe, Ranong, Thailand, 17 Jan. 1963, W.

267 Songprakob, RE7013 (BPBM); 2♀, Thadindang, Phat Phayun [as Phatphayan],

268 Phatthalung, Thailand, 25 Jul. 1962, W. Songprakob, RE6339 (BPBM). **Non-types** ex

269 *Cymbirhynchus macrorhynchus siamensis*: 1♂, 3♀, Ban Hua Thanon, Khlong Khlung,

270 Kamphaeng-Phet, Thailand, 6 Apr. 1953, R.E. Elbel & H.G. Deignan, RE-2384, RT-B-

271 17871 (BPBM).

272 *Etymology*: The specific name is derived from “*kúanos*”, Greek for “blue”, and “*phóbos*”,

273 Greek for “fear”. This refers to the large, cyan bill of the host that this louse species

274 would have reason to fear.

275 *ZooBank registration:*

276 **Remarks** No significant differences have been found between material from the two host
277 subspecies.

278 *Guimaraesiella cyanophoba* **n. sp.** is not very similar to any other species of
279 *Guimaraesiella*, but may be most similar to *G. khlengkhlungensis* **n. sp.**, with which it
280 shares the flat anterior margin of the mesosome and the roughly quadratic gonopore (Figs
281 5, 19). These two species can be separated by the following characters: *ps* present on
282 male abdominal segment III in *G. khlengkhlungensis* (Fig. 1), but absent in *G.*
283 *cyanophoba* (Fig. 15); *aps* present on male tergopleurite V (and in some specimens also
284 IV) in *G. khlengkhlungensis* (Fig. 1), but absent on these segments in *G. cyanophoba*
285 (Fig. 15); male tergopleurite VIII with two setae on each side (not counting
286 trichobothrium) in *G. cyanophoba* (Fig. 15), but with three setae on each side in *G.*
287 *khlengkhlungensis* (Fig. 1); antero-lateral corners of mesosome with bluntly rectangular
288 corners in *G. cyanophoba* (Fig. 19; in some specimens broader than illustrated here), but
289 with bluntly hooked corners in *G. khlengkhlungensis* (Fig. 5).

290

291 *Guimaraesiella altunai* **n. sp.**

292 (Figs 22–28)

293 **Description** *Both sexes:* Head broadly trapezoidal (Fig. 24), lateral margins of
294 preantennal head slightly concave, frons broadly concave. Marginal carina of moderate,
295 irregular, width, interrupted laterally and submedianly. Dorsal preantennal carina
296 reaching *dsms*, *ads*, and lateral head margins, not extending median to *ads*. Ventral
297 anterior plate large, rounded triangular. Dorsal anterior plate not separate, longer than

298 wide. Head chaetotaxy as in Fig. 24. Preantennal nodi moderate, bulging. Preocular nodi
299 much larger than minute postocular nodi. Marginal temporal carina narrow, of even
300 width. Gular plate with median point. Thoracic and abdominal segments as in Figs 22–
301 23. Leg seta *fI-v4* absent.

302 *Male*: Thoracic and abdominal chaetotaxy as in Fig. 22; *ps* absent of abdominal segment
303 III; *aps* present on tergopleurite IV; Tergopleurite VIII with two setae on each side (not
304 counting trichobothrium). Basal apodeme with concave lateral margins (Fig. 25).

305 Proximal mesosome substantially overlaps basal apodeme, anterior margin convergent to
306 median point, antero-lateral corners rounded. Ventral sclerite not reaching near anterior
307 margin of mesosome; distal section not rugose; chaetotaxy as in Fig. 26. Mesosomal
308 lobes bulging at about mid-length of distal mesosome. Gonopore broader than long,
309 roughly trapezoidal, lateral margins serrated. Parameral heads slightly extended medio-
310 posteriorly (Fig. 27); parameral blades stout, short; *pst1–2* as in Fig. 27.

311 *Female*: Thoracic and abdominal chaetotaxy as in Fig. 23; *ps* absent on abdominal
312 segment III. Distal subgenital plate poorly visible in examined specimens, and here
313 illustrated approximately; submarginal extensions likely more slender than illustrated
314 (Fig. 28); distal end broad. Vulval margin bulging medianly, with 2–3 short, slender *vms*
315 and 6–7 short, thorn-like *vss* on each side; 3–4 short, slender *vos* on each side of
316 subgenital plate; distal 1–2 *vos* median to *vss*.

317 **Taxonomic summary**

318 *Type host*: *Calypomena viridis caudacuta* Swainson, 1838 – green broadbill.

319 *Type locality*: Terengganu, Malaysia.

320 *Specimens deposited:* Ex *Calyptomena viridis caudacuta*: **Holotype** ♂, 102° 40' E, 5° 28'
321 N, elev. 140 ft., Terengganu [as Trengganu], Malaysia, 24 Mar. 1974, Gn. Lawit
322 Expedition, Brit. Mus. 1974-2 (NHML). **Paratypes.** 1♂, 4♀, same data as holotype
323 (NHML). **Non-types.** Ex *Calyptomena viridis* ssp.: 2♂, no locality [“Java” stated on
324 slide, but this is outside the range of the host], M.M. (NHML). Ex *C. v. caudacuta*: 1♀,
325 Thung Nui, Satun [as Saton], Thailand, 12 Sep. 1963, W. Songprakob & W.S. Laong,
326 WS503 (UMSP).

327 *Etymology:* The specific name is in honor of Juan Altuna (previously in the Clayton/Bush
328 Lab, at the University of Utah), in recognition of his considerable contributions to our
329 understanding of the biology and evolution of chewing lice.

330 *ZooBank registration:*

331 **Remarks.** *Guimaraesiella altunai* **n. sp.** is most similar to *G. latirostris* **n. sp.**, with
332 which it shares the following characters: *aps* present on male tergopleurite V (Figs 8, 22);
333 *ps* absent on male abdominal segment III (Figs 8, 22); male tergopleurite VIII with two
334 posterior setae on each side (not counting trichobothrium; Figs 8, 22); female abdominal
335 segment IV with two *ps* on each side (Figs 9, 23); proximal mesosome convergent to
336 median point (Figs 12, 26). These two species can be separated by the following
337 characters: preantennal area proportionately shorter and broader in *G. latirostris* (Fig. 10)
338 than in *G. altunai* (Fig. 24); ventral sclerite of male mesosome almost reaches anterior
339 margin of mesosome in *G. latirostris* (Fig. 12), but not in *G. altunai* (Fig. 26); lateral
340 margins of mesosome with distinct bulge at mid-length in *G. altunai* (Fig. 26), but gently
341 rounded in *G. latirostris* (Fig. 12); distal margin of ventral sclerite with rugose area in *G.*
342 *latirostris* (Fig. 12), but smooth in *G. altunai* (Fig. 26); gonopore more rounded in outline

343 and situated farther anterior in *G. latirostris* (Fig. 12) than in *G. altunai* (Fig. 26).
344 Females best separated on head shape, as vulval chaetotaxy overlaps between the two
345 species.

346

347 ***Guimaraesiella forcipata* n. sp.**

348 (Figs 29–35)

349 **Description** *Both sexes*: Head rounded truncated triangular (Fig. 31), lateral margins of
350 preantennal area convex, frons very narrowly but deeply concave. Marginal carina broad,
351 of irregular width, interrupted laterally and submedianly. Dorsal preantennal carina
352 reaching *dsms*, *ads*, and lateral head margins, not extending median to *ads*. Ventral
353 anterior plate large, elongated. Dorsal anterior plate not separate, longer than wide. Head
354 chaetotaxy as in Fig. 31. Preantennal nodi large, bulging. Preocular nodi larger than
355 minute postocular nodi. Marginal temporal carina very narrow, of even width. Gular plate
356 with median point. Thoracic and abdominal segments as in Figs 29–30. Leg seta *fI-v4*
357 absent.

358 *Male*: Thoracic and abdominal chaetotaxy as in Fig. 29; *ps* absent on abdominal segment
359 III; *aps* absent on tergopleurite V; tergopleurite VIII with two setae on each side (not
360 counting trichobothrium). Basal apodeme broad, narrowing distally (Fig. 32). Proximal
361 mesosome almost flat, barely or not overlapping with basal apodeme. Ventral sclerite
362 broad, with flattened anterior end almost reaching proximal margin; distal section diffuse
363 medially, and with undulating postero-lateral margins; chaetotaxy as in Fig. 33.

364 Mesosomal lobes slight, distal third of mesosome much narrower than proximal section.

365 Gonopore large, roughly oval in outline, with serrated lateral margins. Parameral heads

366 small (Fig. 34); parameral blades long, stout, slightly extended distally; *pst1*–2 as in Fig.
367 34.

368 *Female*: Thoracic and abdominal chaetotaxy as in Fig. 30; *ps* absent on segment III.

369 Subgenital plate diffuse distally in all examined material, and illustrated approximately;

370 submarginal extensions likely narrower than illustrated (Fig. 35). Vulval margin gently

371 rounded, with 3–4 short, slender *vms* and 8–10 short, thorn-like *vss* on each side; 6–7

372 short, slender *vos* one each side of subgenital plate; 1–2 distal *vos* median to *vss*.

373 **Taxonomic summary**

374 *Type host*: *Eurylaimus steerii steerii* Sharpe, 1876 – wattled broadbill.

375 *Type locality*: Malaita, Mindanao, Philippines.

376 *Specimens deposited*: **Holotype** ♂, Malaita, Mindanao, Philippines, SUBBM-1099

377 (BPBM). **Paratypes**. 6♂, 3♀, same data as holotype (BPBM); 2♂, 4♀, same locality,

378 SUBBM-1102 (BPBM).

379 *Etymology*: The species name is derived from “*forcipatus*”, Latin for “pincer-shaped”,

380 referring to the narrow and highly convergent frons of this species.

381 *ZooBank registration*:

382 **Remarks**. In some specimens there appears to be a slight thickening of the median
383 section of the hyaline margin, similar to that seen in *e.g.* *Philopteroides*. This thickening
384 is absent in other specimens, and may be due to a folding of the hyaline margin during
385 mounting. Fresh specimens are needed to establish the true nature of this character.

386 No described species of *Guimaraesiella* appear to be morphologically similar to

387 *Guimaraesiella forcipata* **n. sp.**, and we have not seen any similar species among the

388 approximately 100 undescribed species we have examined. This species can be separated

389 from all described species of *Guimaraesiella* by the unique head shape (Fig. 31) and the
390 short, almost quadratic mesosome (Fig. 33) not or only barely overlapping with the basal
391 apodeme (Fig. 32).

392

393 **DISCUSSION**

394 The hosts of all five species described here are representatives of the Old World
395 suboscines. As such, they are more closely related to groups of birds that typically are not
396 parasitized by *Brueelia*-complex lice, than to the other hosts of the “core” *Guimaraesiella*
397 (Barker et al. 2004). The five species described here are all morphologically typical for
398 the “core” *Guimaraesiella* (Clade A-1 in fig. 3 of Bush et al., 2016). Specimens of
399 *Guimaraesiella* from eurylaimid hosts were placed near the type species of
400 *Guimaraesiella* in this phylogeny. The head shape, extent of dorsal preantennal suture,
401 and the shape of the male genitalia and lack of complete cross-piece in the female
402 genitalia are all consistent with this placement.

403 The placement of *Guimaraesiella* specimens from eurylaimid hosts deep inside a
404 clade comprising *Guimaraesiella* from oscine hosts (Bush et al., 2016) may indicate that
405 these are the descendants of a successful host switch from an oscine to a suboscine host.
406 However, as the species described here are not very similar morphologically (in particular
407 *G. forcipata* **n. sp.**), more than one host switch may be involved. Moreover, the hosts
408 belong to two different families, which are not closely related within the Eurylaimides
409 (e.g. Moyle et al., 2006; Selvatti et al., 2016). The Calyptomenidae are more closely
410 related to the Pittidae, which are not known to be parasitized by any lice in the *Brueelia*-
411 complex (Table 1). This also suggests that multiple host switches may have occurred

412 from oscine to suboscine hosts in Southeast Asia. The majority of “core” *Guimaraesiella*
413 are known from canopy-feeding birds, many of which participate in mixed-species
414 feeding flocks. This also applies to the hosts of the species described here, but not to the
415 Pittidae. Potentially, participation in mixed-species feeding flocks may have facilitated
416 these host switches; however, no detailed study on the effect of mixed-species feeding
417 flocks on chewing louse distribution has been published.

418 Notably, Sychra et al (2014) recently published a case of natural host switching
419 between a pycnonotid host and *Cymbirhynchus macrorhynchus* in Vietnam. This may
420 strengthen the argument that the louse fauna of Asian broadbills is at least partially
421 derived from unrelated hosts. More studies of the louse fauna of Southeast Asian hosts
422 are sorely needed to determine whether or not host switching – including between
423 distantly related hosts – is common in the Old World tropics.

424

425 **Acknowledgements**

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429 in arranging specimens of chewing lice from Vietnam.

430 Loans of specimens were kindly arranged by Paul Brown (NHML), Paul Tinerella
431 (UMSP), and Don Arnold (OSUS).

432

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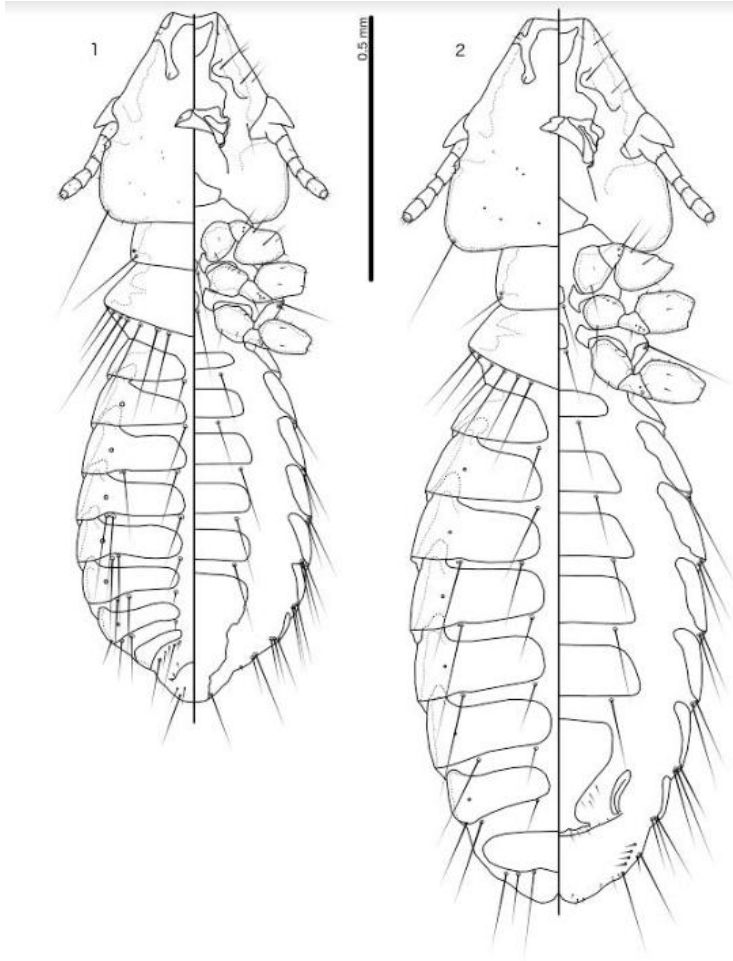
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565

566 **FIGURES and FIGURE LEGENDS**

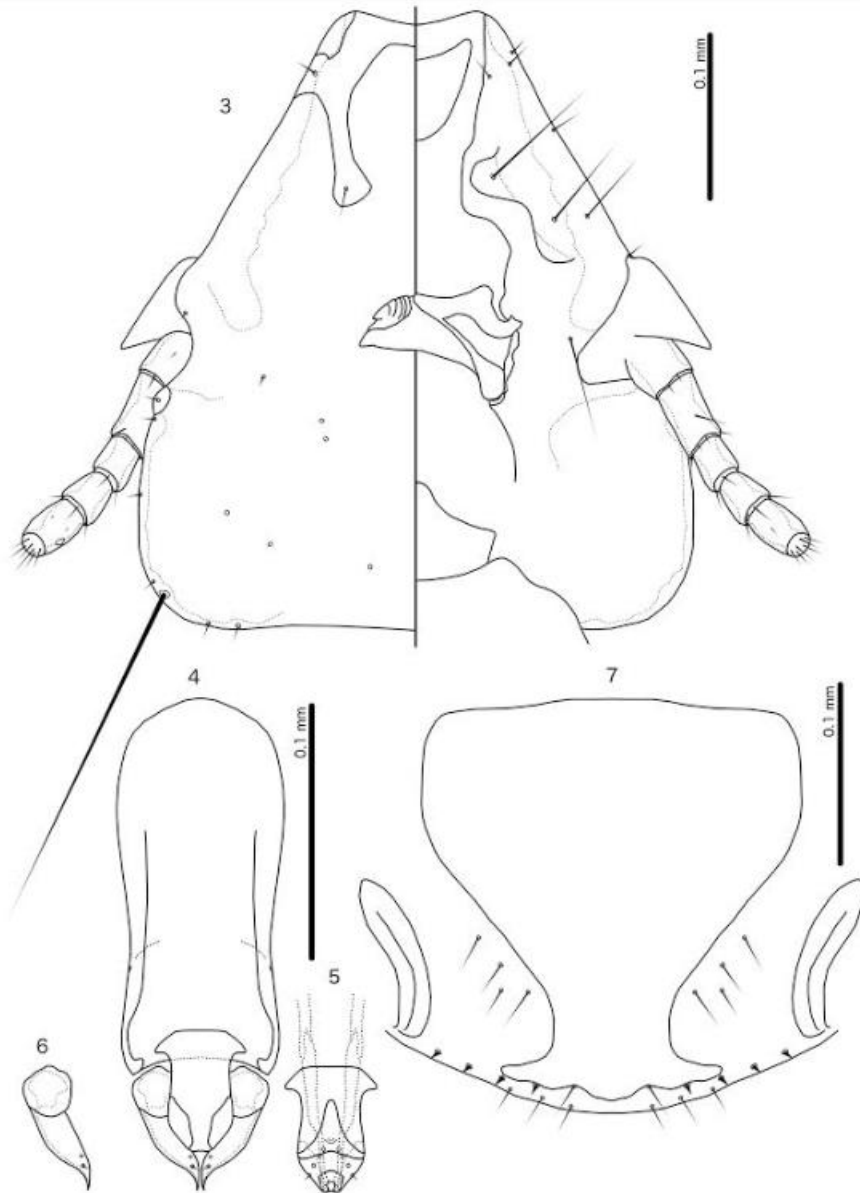


567

568 **Figures 1–2.** *Guimaraesiella khlongklungensis* **n. sp.** ex *Corydon sumatranus laoensis*

569 Meyer de Schauensee, 1929. **(1)** Male habitus, dorsal and ventral views. **(2)** Female

570 habitus, dorsal and ventral views.



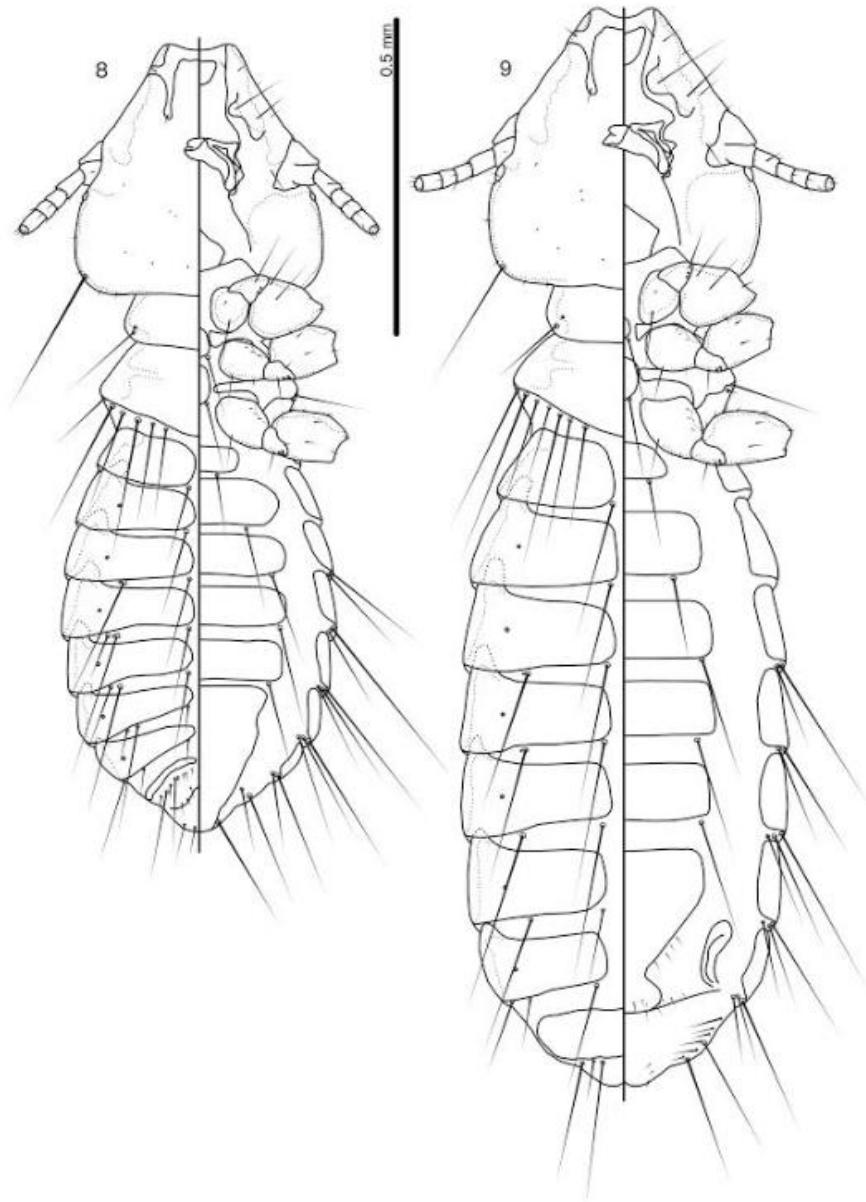
571

572 **Figures 3–7.** *Guimaraesiella khlongklungensis* n. sp. ex *Corydon sumatranus laoensis*

573 Meyer de Schauensee, 1929. **(3)** Male head, dorsal and ventral views. **(4)** Male genitalia,

574 dorsal view. **(5)** Male mesosome, ventral view. **(6)** Male paramere, dorsal view. **(7)**

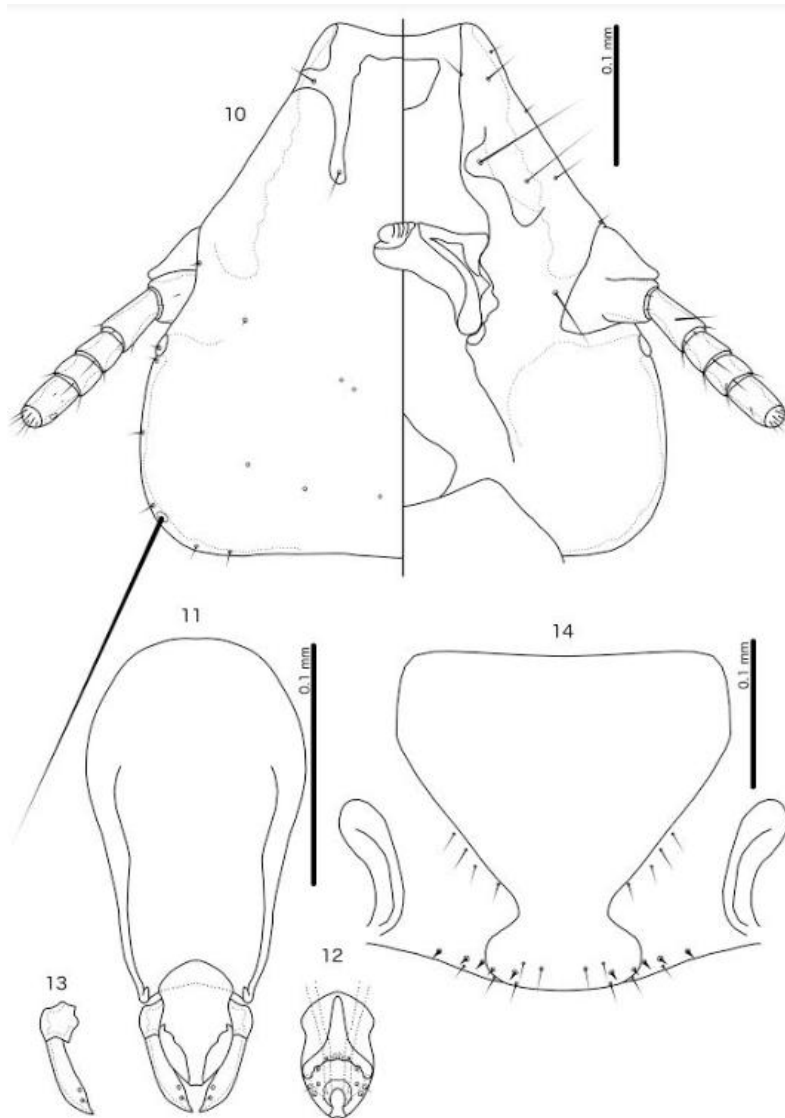
575 Female subgenital plate and vulval margin, ventral view.



576

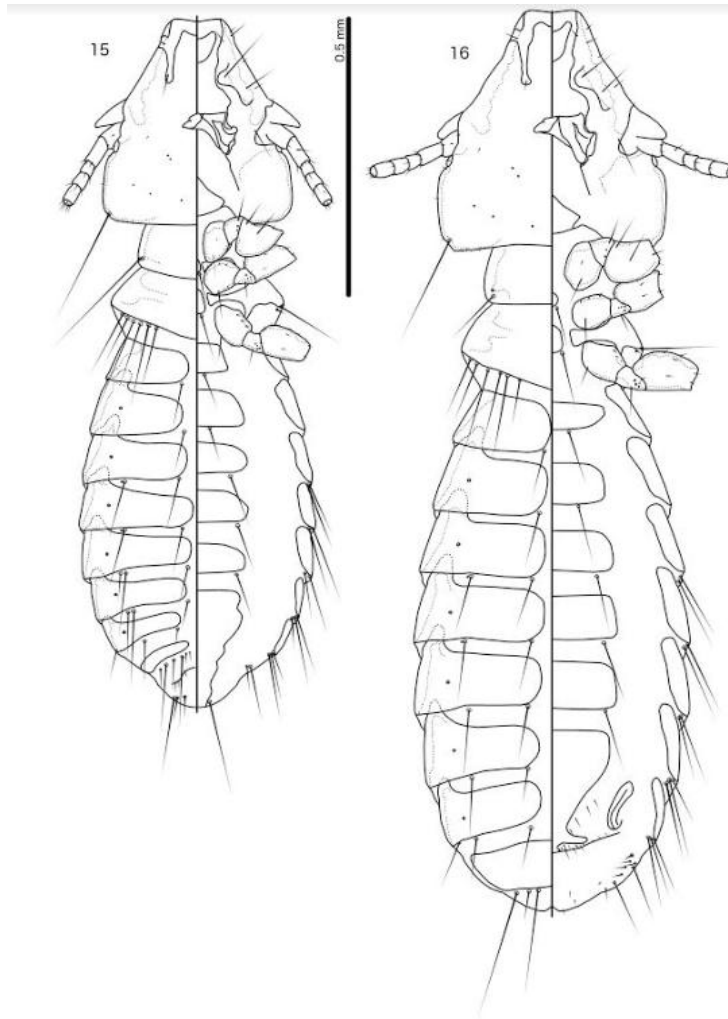
577 **Figures 8–9.** *Guimaraesiella latirostris* n. sp. ex *Eurylaimus ochromalus* Raffles, 1822.

578 **(8)** Male habitus, dorsal and ventral views. **(9)** Female habitus, dorsal and ventral views.



579

580 **Figures 10–14.** *Guimaraesiella latirostris* n. sp. ex *Eurylaimus ochromalus* Raffles,
581 1822. (10) Male head, dorsal and ventral views. (11) Male genitalia, dorsal view. (12)
582 Male mesosome, ventral view. (13) Male paramere, dorsal view. (14) Female subgenital
583 plate and vulval margin, ventral view.

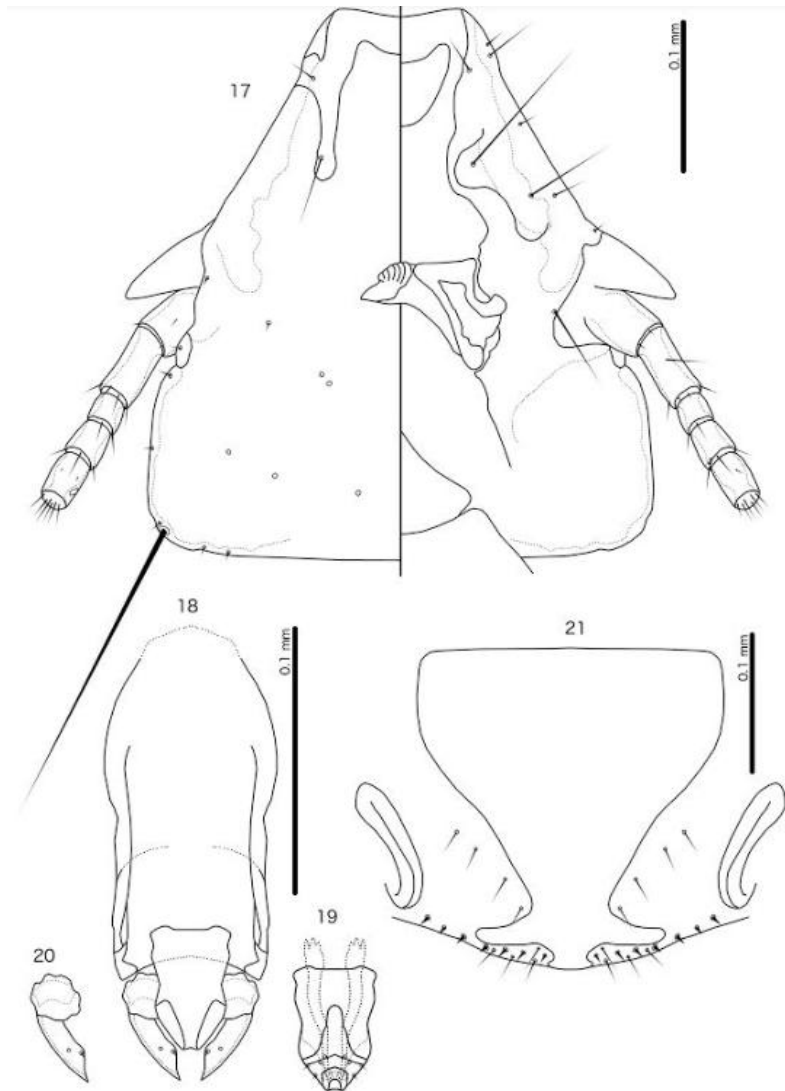


584

585 **Figures 15–16.** *Guimaraesiella cyanophoba* n. sp. ex *Cymbirhynchus macrorhynchus*

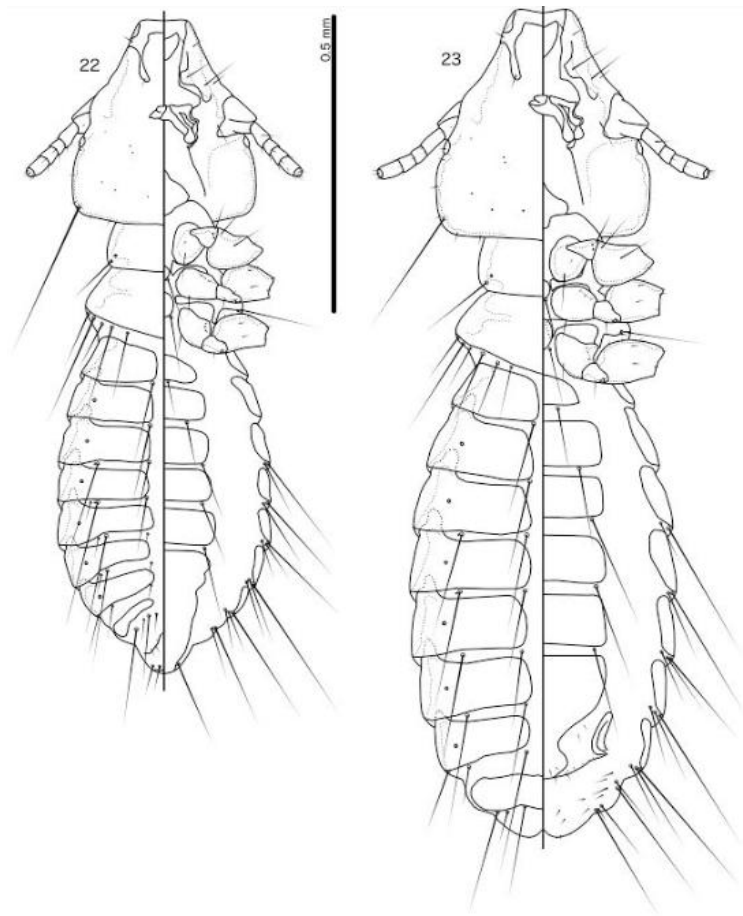
586 *malaccensis* Salvadori, 1874. **(15)** Male habitus, dorsal and ventral views. **(16)** Female

587 habitus, dorsal and ventral views.



588

589 **Figures 17–21.** *Guimaraesiella cyanophoba* n. sp. ex *Cymbirhynchus macrorhynchus*
590 *malaccensis* Salvadori, 1874. **(17)** Male head, dorsal and ventral views. **(18)** Male
591 genitalia, dorsal view. **(19)** Male mesosome, ventral view. **(20)** Male paramere, dorsal
592 view. **(21)** Female subgenital plate and vulval margin, ventral view.

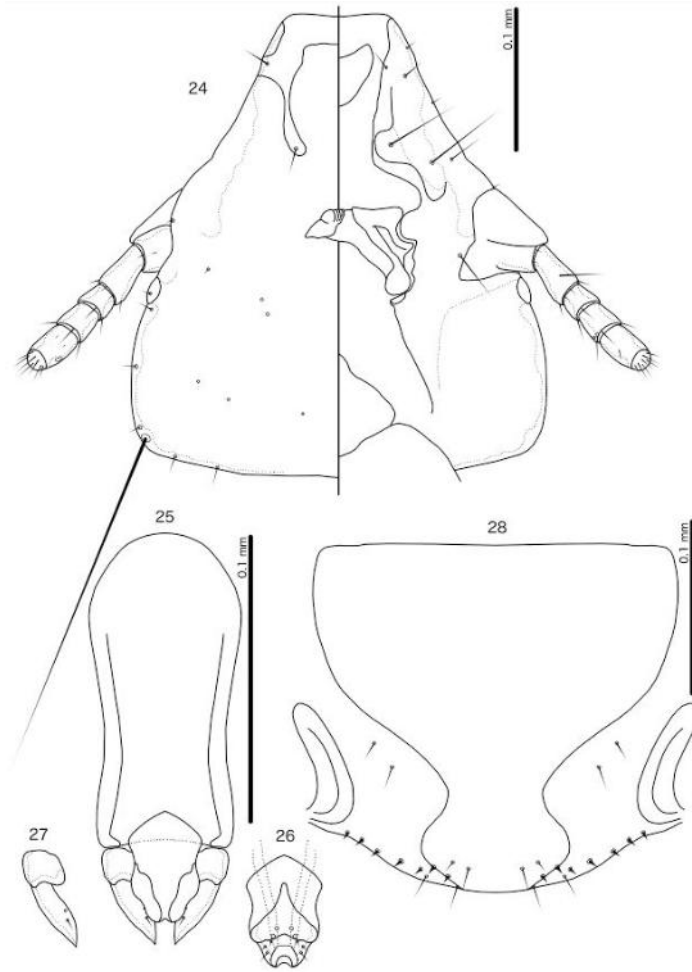


593

594 **Figures 22–23.** *Guimaraesiella altunai* **n. sp.** ex *Calyptomena viridis caudacuta*

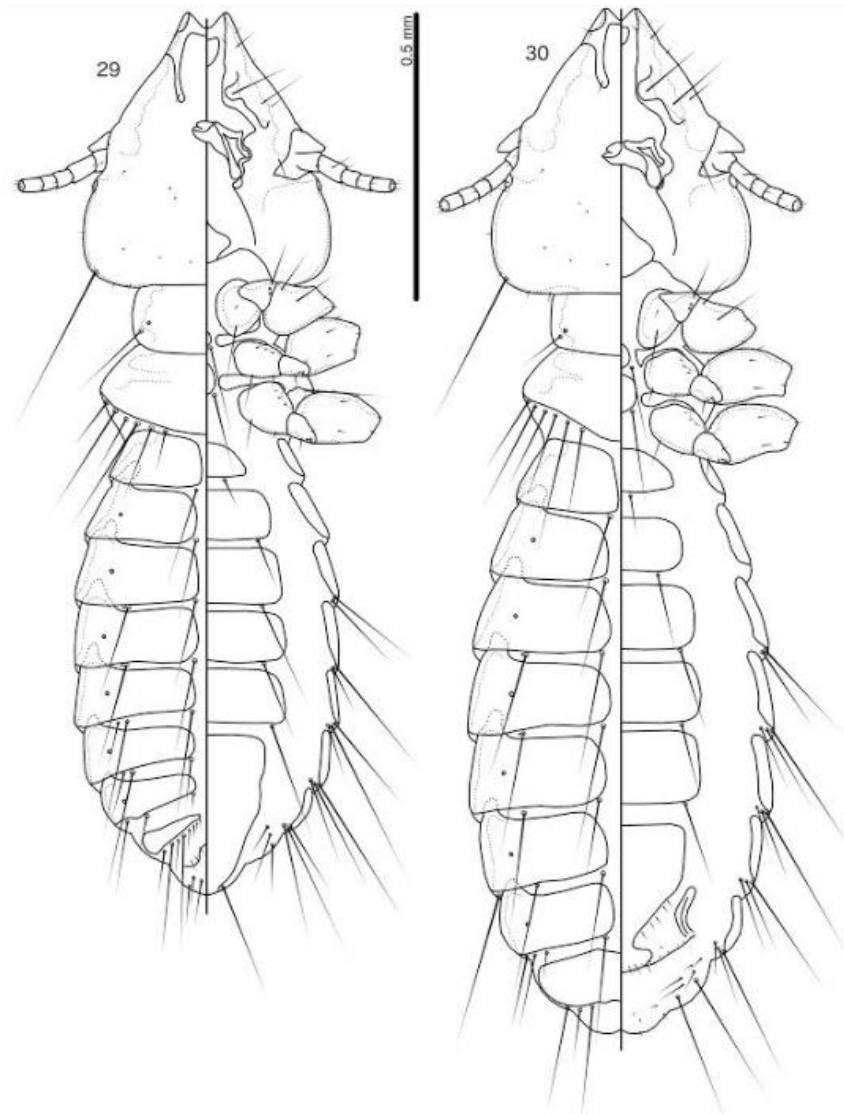
595 Swainson, 1838. **(22)** Male habitus, dorsal and ventral views. **(23)** Female habitus, dorsal

596 and ventral views.



597

598 **Figures 24–28.** *Guimaraesiella altunai* n. sp. ex *Calyptomena viridis caudacuta*
 599 Swainson, 1838. (24) Male head, dorsal and ventral views. (25) Male genitalia, dorsal
 600 view. (26) Male mesosome, ventral view. (27) Male paramere, dorsal view. (28) Female
 601 subgenital plate and vulval margin, ventral view.

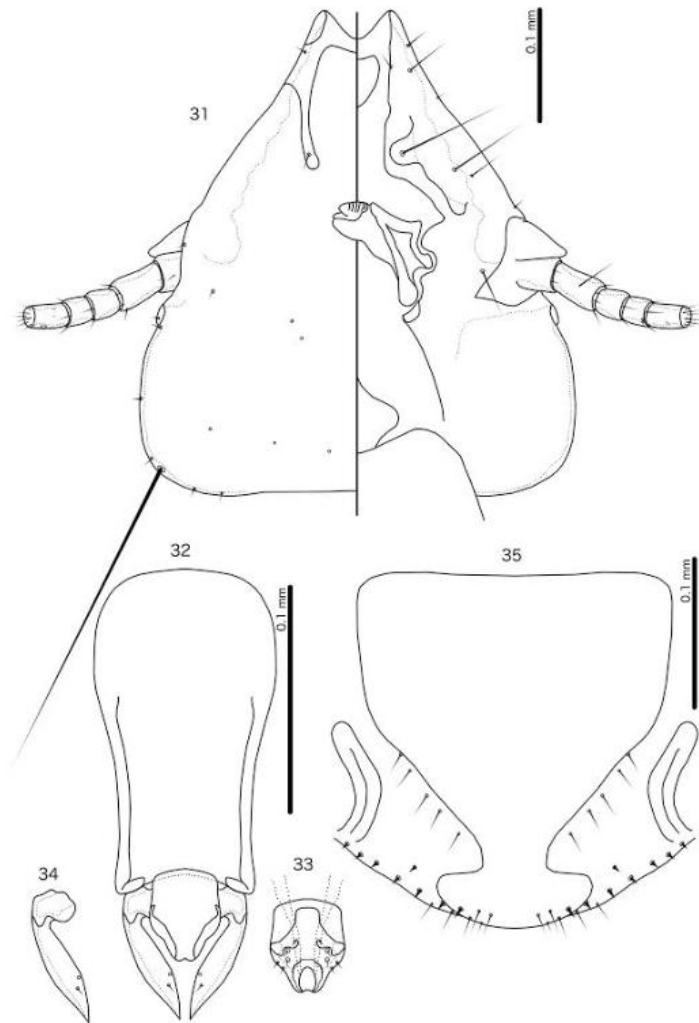


602

603 **Figures 29–30.** *Guimaraesiella forcipata* **n. sp.** ex *Eurylaimus steerii steerii* Sharpe,

604 1876. **(29)** Male habitus, dorsal and ventral views. **(30)** Female habitus, dorsal and ventral

605 views.



606

607 **Figures 31–35.** *Guimaraesiella forcipata* n. sp. ex *Eurylaimus steerii steerii* Sharpe,

608 1876. **(31)** Male head, dorsal and ventral views. **(32)** Male genitalia, dorsal view. **(33)**

609 Male mesosome, ventral view. **(34)** Male paramere, dorsal view. **(35)** Female subgenital

610 plate and vulval margin, ventral view.

611