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Taxonomic revision of the genus *Xenogryllus* Bolívar, 1890 (Orthoptera, Gryllidae, Eneopterinae, Xenogryllini)

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1 **Taxonomic revision of the genus *Xenogryllus* (Orthoptera, Gryllidae,**
2 **Eneopterinae)**

3

4 **Page headlines:** Revision of *Xenogryllus*

5

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21

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23 **Abstract**

24 Subfamily Eneopterinae has been studied for its diversified acoustic modalities and
25 disjunct distribution. The genus *Xenogryllus* Bolívar, 1890 is one of the oldest genera of
26 the subfamily, and the first genus of the tribe Xenogryllini. *Xenogryllus* is known for its
27 low-frequency calling songs and wide distribution across Africa and Asia. It is known
28 from five species and has never been subject to formal taxonomic revision and
29 description of acoustic features of their calling songs is lacking. Therefore, this study
30 consists of a detailed taxonomic revision of all the species. We re-describe or append
31 their taxonomic features using external morphological features and internal genitalic
32 structures. We update the list of *Xenogryllus* by describing three new species from
33 Africa. In addition, we provide keys to identify species and describe the calling songs of
34 five species.

35

36 Introduction

37 The crickets of the subfamily Eneopterinae have been recently studied for the
38 diversity of their communication signals and related structures (e.g., Robillard &
39 Desutter-Grandcolas 2004a, b; Robillard *et al.* 2013; ter Hofstede *et al.*, 2015;
40 Schneider *et al.*, 2017), and for their biogeographical patterns (Nattier *et al.* 2011;
41 Vicente *et al.* 2017; Dong *et al.* 2018). To investigate how this diversity occurred and
42 how the original traits evolved, it is necessary to understand the context in which it
43 happened. The tribe Xenogryllini is the sister group of the most diversified Lebinthini
44 (Vicente *et al.* 2017), therefore, it serves as the best “control lineage” to understand the
45 evolution of unique features in the Lebinthini. A taxonomic, bioacoustics and
46 phylogenetic focus on the tribe Xenogryllini is thus particularly needed.

47 The Xenogryllini are currently composed of two genera, *Xenogryllus* Bolívar,
48 1890 (six species) and *Pseudolebinthus* Robillard, 2006 (two species) according to
49 Orthoptera Species File Online data base (Cigliano *et al.* 2018), but a taxonomic
50 revision was presented as necessary by Robillard (2006). The members of the
51 Xenogryllini produce calling songs with low dominant frequencies (Robillard &
52 Desutter-Grandcolas 2011). However, their spectral and temporal features were never
53 formally documented.

54 In the present study, we conduct a complete taxonomic revision of the genus
55 *Xenogryllus* (Table 1) based on freshly collected specimens or procured from 17
56 natural history repositories. We evaluate the status, redescribe or amend description of
57 the existing species, describe three new species, *Xenogryllus lamottei* Robillard n. sp.,
58 *X. maniema* Robillard & Jaiswara n. sp. and *X. mozambicus* Robillard n. sp., and
59 provide and a key to species.

60

61 **Material and methods**

62 **Material**

63 The material examined belongs to the collections of 17 institutions (see Appendix
64 S1 for lists of material and abbreviations). Newly collected material comes from several
65 field work expeditions in Mozambique (2009), India (2015, 2017) and China (2012,
66 2014, 2017). Newly collected specimens are deposited in the collections of Zoological
67 Survey of India, Kolkata, Muséum national d'Histoire naturelle, Paris and Shaanxi
68 Normal University, Xi'an. Political districts are mentioned for each specimen within lists
69 of materials, and square brackets are used for additional information not mentioned on
70 specimen labels or for translation of key information present on labels in languages
71 other than English.

72

73 **Taxonomic description**

74 Description of studied species follows terminologies as proposed by Robillard *et*
75 *al.* (2014). Observations of external morphological characters and dissection of male
76 and female genitalia were performed using Leica stereomicroscopes MZ16 (at MNHN,
77 Paris) and M205C (at IISER, Mohali). SEM observations were performed at the
78 Plateforme de Microscopie électronique of the MNHN, using a JEOL-JSM 840
79 electronic microscope (7kV), after a 60 s gold-coating. Terminologies for male FW
80 venation follow Ragge (1995) and Robillard & Desutter-Grandcolas (2004b). Male and
81 female genitalia were dissected either from dry preserved or freshly killed specimens.
82 Male genitalia were dissected by making a small slit between paraproct and subgenital
83 plate. Female copulatory papilla was dissected out by cutting the membrane between
84 ovipositor and subgenital plate. Dissected genitalia were cleared in 10% cold KOH
85 solution and preserved in glass vials containing glycerine. Terminologies for genitalia
86 follow Desutter (1987), modified in Desutter-Grandcolas (2003) and Robillard &

87 Desutter-Grandcolas (2004a). Imaging of male and female genitalia were made using
88 an AmScope MU1000 digital camera () or with a Canon EOS 40D Digital SLR camera
89 (at MNHN), or with a MC120 HD, Leica, Germany (at IISER, Mohali). To highlight the
90 structural components of male and female genitalia, water solution containing a drop of
91 JBL Punktol was used. To fix orientations and stabilization of genitalia for photography,
92 a clear and viscous Power Plast Hand Sanitizer was used following Su (2016).

93

94 **Abbreviations used in taxonomic descriptions**

95 General morphology: FI, FII, FIII, fore, median, hind femur; FW, forewing; TI, TII,
96 TIII, fore, median, hind tibia; Tarsomere I/II/III-1: basal segment of fore, median and
97 hind leg tarsomere.

98 Tegminal venation: 1A-4A, first to fourth anal veins; CuA, anterior cubitus; CuA1,
99 CuA2, ... first, second, ... branches of CuA; CuP, posterior cubitus; M, median vein; R,
100 radial vein; Sc, subcostal vein and its branches; c1-3, first to third cells of C alignment;
101 d1 cell (mirror), first cell(s) of D alignment; d2, second cell of D alignment; e1, first cell
102 of E alignment.

103 Species abbreviations used in figures: ene, *Xenogryllus eneopteroides*; lam,
104 *Xenogryllus lamottei* n. sp.; mai, *Xenogryllus maichauensis*; man, *Xenogryllus*
105 *maniema* n. sp.; mar, *Xenogryllus marmoratus*; moz, *Xenogryllus mozambicus* n. sp.;
106 tra, *Xenogryllus transversus*; ulu, *Xenogryllus ululiu*.

107

108 **Abbreviations of Institutions used in the lists of material**

109

110 AMNH: American Museum of Natural History, New York, USA.

111 ECNU: East China Normal University, Shanghai, China.

112 DEI: Deutsches Entomologisches Institut, Müncheberg, Germany.

113 NHMUK: Natural History Museum (formerly British Museum of Natural History),
114 London, United Kingdom.
115 IISERM: Indian Institute of Science Education and Research Mohali, Punjab, India.
116 MNCN: Museo Nacional de Ciencias Naturales, Madrid, Spain.
117 MNHN: Muséum national d'Histoire naturelle, Paris, France.
118 MRAC: Musée Royal de l'Afrique Centrale, Tervuren, Belgium.
119 NHMW: Naturhistorisches Museum, Vienna, Austria.
120 NWAUFU: Entomological Museum, Northwest A & F University, Yangling, China.
121 RMNH: National Natuurhistorisch Museum (formerly Rijksmuseum van Natuurlijke
122 Historie), Leiden, The Netherlands.
123 SNNU: College of Life Sciences, Shaanxi Normal University, Xi'an, China.
124 SIPPE: Institute of Plant Physiology and Ecology, Shanghai Institutes for Biological
125 Sciences, Chinese Academy of Sciences, China.
126 RBINS: Royal Belgian Institute of Natural Sciences, Brussels, Belgium.
127 ZFMK: Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn,
128 Germany.
129 ZIN: Zoological Institute, Russian Academy of Sciences, S. Petersburg, Russia.
130 ZSI: Zoological Survey of India, Kolkata, India.

131

132 **Measurements**

133 BL, body length in dorsal view, from fastigium to apex of abdomen; FIIL, length
134 of FIII; FIIIW, width of FIII; TIIIL, length of TIII; FWL, forewing length; FWW, forewing
135 width (at the level of maximal width at about 1/3 of FWL); HWT, hind wing tail length
136 (part of the hind wings longer than the FWs); Ias, inner spines on TIII dorsal side above
137 the spurs; Ibs, inner spines on TIII dorsal side between the spurs; Oas, outer spines on
138 TIII dorsal side above the spurs; Obs, outer spines on TIII dorsal side between the
139 spurs; OL, ovipositor length; PronL, pronotum length; PronW, pronotum width; Tallls,

140 spines of third hind tarsomere, not including the apical spines: Ids, inner dorsal spines;
141 Ods, outer dorsal spines; Ols, outer spines on lateral side of TIII.

142

143 **Acoustic analyses**

144 We document the temporal and spectral measurements of calling songs of
145 *Xenogryllus eneopteroides*, *X. maichauensis*, *X. marmoratus*, *X. mozambicus*, *X.*
146 *transversus* and *X. ululiu*. The calling songs of *X. lamottei* n. sp. and *X. maniema* n. sp.
147 are unknown.

148 The basic cricket song terminology follows Ragge & Reynolds (1998). A basic
149 song unit is called syllable and corresponds to one opening-closure cycle of the male
150 forewings. The calling song of *X. transversus* was recorded using TASCAM DR07 MKII
151 at 44.1 k-samples/s sampling rate (RJ). Males of the species *X. mozambicus* n. sp. and
152 *X. marmoratus* were recorded with a modified Condenser Microphone Capsule CM16
153 (Avisoft Bioacoustics, Berlin), with a flat frequency response from 3 to 150 kHz (R.
154 Specht pers. comm.), connected to a Tascam HD-P2 digital recorder (96 kHz sampling
155 frequency, 16 bit) in the field, or using Avisoft Triggering Harddisk Recorder version
156 2.97 and an 8-Pre MOTU sound card at a sampling frequency of 96 k-samples/s (16
157 bit) (TR). The calling songs of *X. maichauensis* and *X. ululiu* were obtained from the
158 Orthoptera Species File Online (Cigliano *et al.* 2018) database and were recorded by
159 Sigfrid Ingrish with a Sony WM-D3 recorder with a Universum mono microphone.

160 Acoustic analyses were performed using the computer softwares Avisoft-SASLab
161 Pro version 4.40 (Specht 2009) and Audacity version 2.0.0. Acoustic features were
162 measured either manually on Audacity or using the automatic commands of Avisoft-
163 SASLab Pro. Newly recording files are deposited in the Sound Library of the MNHN
164 (inventory numbers mentioned as MNHN-SO*** in lists of material), and in the
165 Orthoptera Sound Library of Indian Institute of Science Education and Research Mohali,
166 Punjab, India.

167

168 **Systematic part**

169 **Orthoptera**

170 **Gryllidae**

171 **Eneopterinae Saussure, 1874**

172 ***Xenogryllini* Robillard, 2004**

173 *Emended diagnosis.* Crickets of contrasted sizes, generally light brown; head higher
174 than wide in facial view; fastigium rather wide; eyes of variable sizes, usually
175 ornamented with thin dorso-ventral dark stripes. T1 with two tympana, inner one
176 covered by a sclerotized expansion, its membrane visible along a longitudinal slit only;
177 outer tympanum oval in shape, its surface smooth. TIII spurs characteristic of the
178 subfamily, with four pairs of subapical spurs and three apical spurs on each side, the
179 median the longest; subapical spurs rather straight, with curved apex as in Nisitriini.
180 Wings variable within the tribe in males and females. *Male.* Metanotum with
181 characteristic glandular structures, with a dense bunch of very long setae on scutum
182 anterior edge. Dorsal margin of subgenital plate with baso-lateral glandular structure or
183 dorsal edge with a median invagination. *Male FW venation:* 2A and 3A veins narrowly
184 coupled at plectrum level; harp veins variable; mirror generally well developed and
185 rounded; bases of CuA2 and CuA3 fused. *Male genitalia:* Pseudepiphallic lophi well-
186 developed, long and sclerotized, usually with an apical hook-like expansion;
187 pseudepiphallicus with lateral membranous lobes more or less developed; rami fused
188 with pseudepiphallic sclerite, rather short with convergent apex; ectophallic arc faintly
189 or not sclerotized; endophallic sclerite with long latero-posterior arms connected to
190 ectophallic fold, and short anterior region; endophallic apodeme with wide lateral
191 lamellas. Female ovipositor apex not denticulate, variably pointed.

192 *Distribution.* Asia (Japan, China, India, Thailand, Myanmar, Vietnam, Pakistan,
193 Bangladesh) and Sub-Saharan Africa.

194

195 ***Xenogryllus* Bolívar, 1890**

196 Type species: *Xenogryllus eneopteroides* Bolívar, 1890.

197 *Xenogryllus* Bolívar, 1890: 232; Kirby 1906: 106; Chopard 1968: 349; 1969: 307;
198 Vasanth 1993: 130; Robillard & Desutter-Grandcolas 2008: 67; Cigliano *et al.* 2018
199 (Orthoptera Species File Online).

200 Synonym names:

201 *Dindymus* Kirby, 1906: 88 - incorrect spelling of *Dionymus*.

202 *Dionymus* Brunner von Wattenwyl, 1893: 213 – Chopard 1968: 349.

203

204 *Emended diagnosis.* Genus of average to large size, differing from *Pseudolebinthus* by
205 FWs as long or longer than abdomen in both sexes (shorter in *Pseudolebinthus*), hind
206 wings longer than FWs, forming a short tail posterior to FWs. Eyes small and little
207 prominent, located on face. Face with a whitish or yellowish mask with dark spots. FIII
208 long and thin. *Male.* Dorsal disc of pronotum forming a wide trapezoid. FWs almost
209 completely overlapping, widened basally, usually forming a characteristic box around
210 abdomen, twice as wide as abdomen. FW cells with thin longitudinal wrinkles, including
211 harp and mirror, absent in *Pseudolebinthus*. Left and right FWs similar in sclerotization
212 and coloration (asymmetrical in *Pseudolebinthus*). *Male genitalia:* Pseudepiphallic
213 sclerite longer than rami; lophi long and sclerotized (shorter in *Pseudolebinthus*). Lophi
214 with apical hook-like inner expansions. Pseudepiphallic sclerite with lateral
215 membranous lobes. Rami strong and short, their apex convergent and hook-like.
216 *Female.* Dorsal disc of pronotum almost rectangular. FWs as long as in male, not
217 widened, reaching apex of abdomen. Ovipositor flattened longitudinally as in other

218 eneopterine genera, its apex rounded and smooth. *Female copulatory papilla*: long,
219 thin and conical.

220 *Redescription*. Genus of average to large size (Figs 1-2), generally light brown to
221 ochre, with a few dark patterns on FWs. Vertex with five wide longitudinal dark bands
222 (Fig. 4), including a wide median one prolonged on fastigium, two lateral bands more or
223 less marked, made of aggregates of brown dots, and two thin stripes posterior to eyes.
224 Eyes rather small, little prominent, ornamented with thin dorso-ventral dark stripes.
225 Fastigium forming a wide rectangular rostrum slightly prominent on face. Scapes yellow
226 with brown patterns, antennae light brown. Face with a whitish mask with dark spots
227 (Fig. 3). Lateral part of head and lateral lobes of pronotum almost homogeneously
228 brown. Legs usually homogeneously brown. TI with two tympana; inner tympanum
229 covered by a sclerotized expansion, its membrane visible along a small longitudinal slit
230 only; outer tympanum oval in shape, its surface smooth. TI with three apical spurs;
231 outer dorsal apical spur absent. TII with four apical spurs (two dorsal and two ventral).
232 FIII long and thin; TIII with four outer and four inner sub-apical spurs.

233 *Male*. Dorsal disc of pronotum forming a wide trapezoid FWs almost completely
234 overlapping, widened basally, forming a wide box around abdomen (Fig. 5), with
235 glandular structures on metanotum (Fig. 6). FW cells with thin longitudinal wrinkles.
236 Left and right FWs similar in sclerotization and coloration. FWs light brown, translucent,
237 with the following pattern of black spots on dorsal field: wide black transverse band
238 anterior to transverse part of 1A, including file angle in some species; four corners or
239 mirror and median area of chords with faint dark markings (Fig. 5). Harp with two
240 complete parallel oblique veins and one incomplete oblique vein between diagonal vein
241 and first complete oblique; harp distal angle concave. Mirror large and rounded,
242 separated in two sub-equal parts by a sinuous accessory vein. Cell d2 crescent-like,
243 thin and underlying mirror. Cell e1 very long and curved, underlying posterior margin of
244 mirror. Apical field well developed, triangular, including 4-5 cell alignments. Lateral field

245 crossed by numerous parallel projections of Sc. *Male genitalia* (Fig.7): Pseudepiphallic
246 sclerite longer than rami; pseudepiphallic lophi very long and sclerotized, with apical
247 hook-like inner expansions (Fig. 8). Pseudepiphallic sclerite with lateral membranous
248 lobes. Membrane at bases of pseudepiphallus forming a sclerotized plate; basal margin
249 with a ventral reinforcement. Rami usually strong with convergent hook-like apex; most
250 often with a ventral posterior expansion reaching base of pseudepiphallic membranous
251 lateral lobes. Pseudepiphallic parameres with one strong rectangular ventral lobe
252 covered with scale-like sculptures, with a basal lobe mostly membranous. Ectophallic
253 arc nearly membranous. Ectophallic apodemes usually strong. Ectophallic ventral
254 expansions well developed and sclerotized. Ectophallic fold entirely sclerotized
255 ventrally, its lateral expansions partly fused with lateral arms of endophallic sclerite.
256 Endophallic sclerite forming a flat plate with long latero-posterior arms and a short
257 medio-posterior triangular expansion. Endophallic apodeme with two wide lateral
258 lamellas and no dorsal crest.

259 *Female*. Pronotum dorsal disc almost rectangular. FWs as long as in male, reaching
260 apex of abdomen or slightly longer, not widened as in male; light brown with a dark
261 spot of variable size between veins CuP and CuA, near lateral angle, at $\frac{1}{4}$ of FW
262 length; with strong longitudinal veins and faint transverse ones. Lateral field crossed by
263 numerous parallel projections of Sc; area between R and Sc most often with a thin dark
264 brown band. Subgenital plate variably indented apically (Fig. 9). Ovipositor flattened
265 longitudinally, its apex rounded and smooth (Fig. 10). *Female copulatory papilla*: long,
266 thin and conical, its sclerotization variable (Fig. 11).

267 *Distribution*. Japan, Southern China, Taiwan, India, Sri Lanka, Thailand, Myanmar,
268 Vietnam, Bangladesh and Sub-Saharan Africa.

269 *Natural history*. *Xenogryllus* species live in open areas, in grassland and savannah.
270 Males sing at night from low bushy vegetation.

271

272 **Key to species of *Xenogryllus***

- 273 1. Dorsal disc of pronotum carinated laterally. Eyes higher than long in lateral view,
 274 occupying half of head height
 275 2
- 276 - Dorsal disc of pronotum not carinated laterally. Eyes as long as high in lateral view,
 277 restricted to dorsal third of head
 278 4
- 279
- 280 2. Face almost flat in lateral view *X. eneopteroides* Bolívar,
 281 1890
- 282 - Face rounded in lateral view
 283 3
- 284
- 285 3. Face bulbous in lateral view. Size rather larger. Male genitalia: Pseudepiphallid lophi
 286 (Fig. 8F) ended by a small lamella, their inner margin almost straight,
 287 membranous..... *X. mozambicus* Robillard
 288 n. sp.
- 289 - Face less rounded in lateral view. Size rather shorter. Male genitalia: Pseudepiphallid
 290 lophi (Fig. 8E) ended by a long conical apex and with a widened inner membranous
 291 margin *X. maniema* Robillard &
 292 Jaiswara n. sp.
- 293
- 294 4. Male FWs well widened basally, forming a wide box around
 295 abdomen.....5

296 - Male FWs not widened, as wide as abdomen..... *X. lamottei* Robillard
297 n. sp.
298
299 5. Size larger (body length > 20 mm). Male genitalia: pseudepiphallic lophi strong,
300 ended by a sharp apex with a dorsal preapical pointed expansion. Female subgenital
301 plate posterior margin clearly
302 indented.....6
303 - Size small (body length <20 mm). Male genitalia: pseudepiphallic lophi very long and
304 thin, ended by a lamella, without dorsal preapical pointed expansion. Female
305 subgenital plate posterior margin not indented (Fig. 9B)..... *X.*
306 *marmoratus* (Haan, 1844)
307
308 6. Male genitalia: Pseudepiphallic lophi with pseudepiphallic lophi forming curved
309 elongate hooks widened apically (Fig. 8D). Female subgenital plate posterior margin
310 indentation rounded laterally, as wide as long (Fig. 9C)..... *X. maichauensis*
311 Gorochov, 1992
312 - Male genitalia: Pseudepiphallic lophi straight apically. Female subgenital plate
313 posterior margin indentation pointed laterally
314 7
315
316 7. Size larger. Male genitalia with larger pseudepiphallic sclerite; lophi proportionally
317 smaller (Fig. 8I), fused only basally, separated by a deep indentation. Female
318 subgenital plate posterior margin indentation very deep, longer than wide (Fig.
319 9G)..... *X. transversus* (Walker,
320 1869)

321 - Size smaller. Male genitalia with smaller pseudepiphallid sclerite; lophi fused on half
322 of their length (Fig. 8H). Female subgenital plate posterior margin indentation weak,
323 wider than long (Fig. 9E).....X.

324 *ululu* Gorochov, 1990

325

326 ***Xenogryllus eneopteroides* Bolívar, 1890**

327 (Figs 1A-C; 3A-B; 4A; 5A; 6; 7A-C; 8A-B; 9A; 10A; 11A-B)

328

329 *Xenogryllus eneopteroides* Bolívar, 1890: 232 – Karsch 1893: 204; Kirby 1906: 106;
330 Giglio-Tos 1907: 26; Bolívar 1910: 544; Chopard 1954: 80; Chopard 1968: 349;
331 Chiffaud & Gillon 1984 (life history); Paris 1994[1993]: 69 (lectotype designated);
332 Robillard & Desutter-Grandcolas 2004a: 578; 2004b: 273 (morphological phylogeny);
333 2006: 644; 2008: 67; 2011: 637; Robillard 2006: 673; Robillard *et al.* 2007: 1267 (song
334 frequency); Nattier *et al.* 2011: 2201 (molecular phylogeny); Chintauan-Marquier *et al.*
335 2016: 62 (molecular phylogeny); Vicente *et al.* 2017: 2203 (historical biogeography);
336 Cigliano *et al.* 2018 (Orthoptera Species File Online).

337 *Xenogryllus eucopteroides* - Kevan & Knipper 1961: 368 (misspelling); Chopard 1968:
338 349.

339

340 *Type material.* Lectotype, ♂, **Angola:** Duque de Bragança, Bayão (Paris, 1994)
341 [MNCN, examined on photograph].

342 *Additional material examined.* **Benin:** Bas-Dahomey, plateaux de Zagnamado et de
343 Ketou, forêt d'Aqua-queré (saison sèche), 1910 P. Ducorps, 1♀ (MNHN). **Cameroun:**
344 [L.] Conradt, 1♂, identified *Xenogryllus eneopteroides* Bol. (MNHN). Reg[ion] de Kribi,
345 1925, littoral, saison humide, Dr. Gromier, 1♂ (MNHN). Kamerun [Cameroun], Pipindi
346 [Bipindi], Eitel ded. 1♀, identified *Xenogryllus eneopteroides* Bol. (MNHN). 10 km N. of

347 Yaoundé, E. of Agronomy Station, Nkolbisson, 10.vii.1975, N. D. Jago, 1♂, identified
348 *Xenogryllus eneopteroides* Bolivar by B. C. Townsend, 1976 (NHMUK 010926525).
349 **Central African Republic:** République Centrafricaine, 75 km WNW Mbaiki, N'Gotto
350 [Ngoto], W Lobaye, savane arbustive, 7.iv.1995, nuit [night], L. Desutter-Grandcolas, 1
351 juvenile, n°14, molecular sample Xen-CA (MNHN-E0-ENSIF3159); 1♂, #1, sur plant
352 [on plant] (MNHN). **Democratic Republic of the Congo:** Congo, 20 km from L. Tumba
353 (towards Coquilhatville) [Mbandaka], 5.iii.1964, from grassy clearing in forest, 1♂, 1♀,
354 Tyson Roberts, Brit. Mus. 1982-71 (NHMUK 010926531, 010926572). Kalembe,
355 15.ix.1947, Miss. Tanganika, 1♀ (RBINS). Lukafa [Lukafu], Congo Belge, 6.xii.1938,
356 H.J. Brédo, 1♀, R.Mus.Nat. Belg.I.G.12.204 (RBINS). Belgian Congo, Aru, iii.1936, 5♂,
357 2♀, H.J. Bredo, dry Acacia bush (NHMUK 010926536, 010926527, 010926578,
358 010926580, 010926539, 010926566, 010926569). Niangara, v-vi-1915, 28°0E 3°40"N,
359 1♂ (AMNH). Haut-Ituri: Faradje, 1♂, Blommaert, Musée du Congo, identified
360 *Xenogryllus eneopteroides* by L. Chopard, R. Det. N 2814 (MRAC). S.E. Katanga:
361 Ngaye: xi-xii.1931, 1♂, R.P. Claquin, Musée du Congo, identified *Xenogryllus*
362 *eneopteroides* by L. Chopard, R. Det. N 2814 (MRAC); 1932, 1♂, 1♀, R.P. Claquin,
363 Musée du Congo, identified *Xenogryllus eneopteroides* by L. Chopard, R. Det. DD3509
364 (MRAC). Haut-Uele, vi.1925, 1♀, Musée du Congo, identified *Xenogryllus*
365 *eneopteroides* by L. Chopard, R. Det. N 2814 (MRAC). Kibali-Ituri: Geti, ii-iv.1937, 1♂,
366 Ch. Scops, Musée du Congo, identified *Xenogryllus eneopteroides* by L. Chopard, R.
367 Det. B 5318 (MRAC). **Gabon:** Plateaux Batéké, piste Ekalla, 30 km W Leconi [Lekoni],
368 milieu herbeux, 19.vi.1994L. Desutter-Grandcolas: 1 juvenile, n°61, jour [day], litière
369 [leaf litter], molecular sample Xen-GA (MNHN-EO-ENSIF3442); 1♂, n°3, nuit [night],
370 sur plante – base tronc [on plant, low on tree trunk] (MNHN). Bas Ogooué, 1♂,
371 identified *Xenogryllus eneopteroides* Bol. by L. Chopard (MNHN). Ntoum, 19.vii.[19]85,
372 A. Pauly rec, 2♂, 2♀, 2 juveniles, lumière (RBINS). **Ghana:** Eastern region,
373 Hansowodze, 2 mls from Kade A.R.S. [Agricultural Research Station], 19.vii.1963, I. K.
374 Bacheampong, 4♂ (NHMUK 010926524, 010926567, 010926528, 010926571).

375 Ghana, Togoland plateau, grassy, summit above [Nkonya] Wurupong, 23.xii.1959, N.D.
 376 Jago, 1♂, Brit. Mus. 1965-474 (NHMUK 010926535). Eastern region, Kade Agr. Res.
 377 Stn [Agricultural Research Station], 11.vii.1963, I. K. Bacheampong, 2♂, Brit. Mus.
 378 1965-474 (NHMUK 010926526, 010926538). Transvolta, Togoland, Amedzofe:
 379 3.v.1959, (montane grass), 1♀, N.D. Jago, Brit. Mus. 1965-474 (NHMUK 010926529);
 380 25.v.[19]59, N.D. Jago, Brit. Mus. 1965-474 (NHMUK 010926579). Western Reg.[ion]
 381 mls E of Elmina, 1°20W 5°05.5N, xii.1960, 1♂, 1♀, N.D. Jago, identified *Xenogryllus*
 382 *eneopteroides* by P.C. Tinning, 1966, Brit. Mus. 1965-474 (NHMUK 010926509,
 383 010926511). T.v.T [Trans-Volta Togo], Ho-Hohoe rd. 10 miles from Volta bridge,
 384 iii.1960, N.D. Jago, Brit. Mus. 1965-474 (NHMUK 010926553). Western Reg.
 385 Asankragua-Enchi rd., Tano R. Ferry, 24.ix.1962, 1♂, N.D. Jago, Brit. Mus. 1965-474
 386 (NHMUK 010926510). **Guinea:** Kaoulenta [Kéoulenta], [Mount] Nimba (Guinée), ii-
 387 vi.[19]42, M. Lamotte, 1♂, 1♀, 2 juveniles (MNHN). Nimba (Guinée), [Mount] Pierre
 388 Richaud, 900 m, M. Lamotte ii-iv.[19]42, 1♀, identified *Xenogryllus eneopteroides* Bol.
 389 by L. Chopard; 1♀ (MNHN). Nimba (Guinée), Lamotte, Amiet, Vanderplaetsen, xii.56-
 390 v.57: Ziéla, 17.ii.[19]57, 1 juvenile; Ziéla, 20.iv.[19]57, 1 juvenile; sav. [savannah] entre
 391 Ziéla et Gbakbré, 9.xii.1956, 1 juvenile; Zgpo. [Zouguépo], 900 m, androp, 18.iv.[19]57,
 392 2♀; sav. [savannah] Ziéla, 3.ii.[19]57, 1 juvenile; sav. [savannah] Ziéla, 20-
 393 25.xii.[19]56, 4 juveniles; sav. [savannah] Kéoulenta, 5.xii.[19]56, 2 juveniles; forêt
 394 Ziéla, 19.ii.[19]57, 1 juvenile; 1 juvenile, A.V. n°23, identified *Xenogryllus eneopteroides*
 395 Bol. larva by L. Chopard; 1 juvenile, A.V. n°38; 1 juvenile, 87CD; 14.iii.[19]57, 1
 396 juvenile, fge n°47 (MNHN). Mt. Nimba, Mt. Leclerc [Mount Jean Charles Leclerc], 1500
 397 m, 23.iii.1991. M. Lamotte, n°319, 1♀ (MNHN); 1♀, molecular sample X22-XenGU
 398 (MNHN-EO-ENSIF1494). Nimba (Guinée), M. Lamotte, xii.56-v.57, 29.x.[19]56, 1♂,
 399 herbes A2 Ziéla, identified *Xenogryllus eneopteroides* Bol. by R. Roy, 1959 (MNHN).
 400 Guinée Française, Diéké [Diecke], P. Chabamaud, 1920, 1♀, identified *Xenogryllus*
 401 *eneopteroides* Bol. by L. Chopard (MNHN). **Ivory Coast:** Lamto (Toumodi), Coll.
 402 E.N.S. Paris, Lamotte et collab.: 1-10.ii.[19]62, 3♂, 2♀; 1963, 1♂, Xen-Robillard-

403 morpho; 25-31.xi.[19]62, 1♀; 15-20.viii.[19]62, 1 juvenile; iv.[19]62, 1♀; 7.xi.[19]62, 1♀;
404 20.xi.[19]62, 1♀; vi.[19]62, 1♀; 4.vii.[19]62, 1♀, mare sav. inondée [inundated
405 savannah] (MNHN). Forêt à 15 km de Lamto, 10.ix.1968, C. Girard, 1♀, 1 juvenile
406 (MNHN). Forêt de Yape, 1♂ (MNHN). Toumodi, xii.1930-iv.1931, Ch. Alluud & P. A.
407 Chapuis, 1♂ (MNHN). Danané, i.1939, 1♀ (MNHN). Lamto (Toumodi), C. Girard:
408 12.ii.1968, savane [savannah], lisière forêt galerie [hedge of gallery forest] 6♂, 3♀, 5
409 juveniles; 1♂, identified *Xenogryllus eneopteroides* Bol. by R. Roy, 1974; 12.iii.1968,
410 lisière, forêt, savane, 1♂, molecular sample XenCI (MNHN-EO-ENSIF1481); 8♂, 2♀, 7
411 juveniles; 1♂, photos MEB [SEM photos] (MNHN-EO-ENSIF1518); 15-30.vii.1968,
412 savane [savannah], lisière forêt galerie [hedge of gallery forest] 1♂, 2♀, 3 juveniles; 27-
413 28.ii.1968, 2♀, 1 juvenile, à la lumière; 10-20.iv.1968, 1♂, à la lumière (MNHN). Lamto
414 (Toumodi), Paul Planquette: 1♀, PNB 18; 1 juvenile, PNB 13B; 15.i.[19]64, 1♀, PNB 64
415 (MNHN). Lamto (Toumodi), 30.vi.[19]62, Coll. E.N.S. Paris, Lamotte *et al.* 1♂, identified
416 *Xenogryllus eneopteroides* by L. Chopard (MNHN). Nimba [Mount]: Lamotte, 1946, Z4,
417 1♀, identified *Xenogryllus eneopteroides* by R. Roy, 1967 (MNHN). Lamto, 1963, 1♂
418 (MNHN). Assinie, 3295-85, Chaper, 1♂ (MNHN). Réserve du Banco [Banco national
419 park], R. Paulian & G. Delamare, 2♂, 2♀, 2 juveniles (MNHN). Bouaké (C.I.),
420 22.v.[19]62, coll. E.N.S. Paris, Lamotte et collab., 1♂ (MNHN). Taiï, 18.viii.1978, G.
421 Couturier, 1♀ (MNHN). Lamto, 1962, P. Le Gall, 2♂, 2♀ (MNHN). **Kenya:** CRS
422 [Catholic Relief Service] Tebere, 0039.5S 3723E, 10.i.[19]72, I.A.D.R. 72/58, 1♀, Brit.
423 Mus. 1982-71 (NHMUK 010926573). **Nigeria:** Lagos, Ikoyi, viii. 1951, L. Bala, 1♂,
424 identified *Xeneogryllus eneopteroides* by L. Chopard (MNHN). U.C. [University College]
425 Ibadan, 5.ix.1952, Tephrosia, leaf, Teph-66 (MNHN) coll. G.H. Caswell, 1♀ (MNHN).
426 Ibadan, 6.vi.[19]23, 1♂, 1605 (NHMUK 010926581). Calabar, Nigeria, 10.iv.[18]82,
427 10.30 A.M., W. edge of [?t] Kwa swamp, E. edge of UNICAL staff quarters; about 50
428 cm up on base of tangle of turns e.g. *Clitonia ? rubiginosa*, notes 72, 1♀, C.I.E. coll
429 A.156 76 Pres by Comm Inst Ent B.M. 1985-1(NHMUK 010926537). **Republic of**
430 **Congo:** Sibiti, xi-1963, mission A. Descarpentries et A. Villiers 1963-1964, 2♂, 1♀

431 (MNHN). Baie de Lagoa, envoi H. Deyrolle, 1♀ (MNHN). Mayumbe, Luki, L. Tiebers [?],
432 1♀, Musée du Congo (MNHN). Odzala, x.1963, 3♂, 3♀, 1 juvenile (MNHN). Congo,
433 1963, 1♀ (MNHN). Ile [island] M'Bamou, 26.vii.1968, Fidèle, 1♀ (MNHN). Boma, Sundi,
434 P. Rolin, 1♂ (RBINS). Banana, F. Busschodts, 4♀ (RBINS). **Sierra Leone:** Piste
435 Bandankoro, 29.v.1963, savane de plaine ayant brûlé [burnt lowland savannah],
436 mission ENS-IFAN aux Monts Loma, 1♂, identified *Xenogryllus eneopteroides* by R.
437 Roy, 1992; 2♂, 3♀ (MNHN). Piste Keimadugu, savane [savannah], 520 m, 29.v.1963,
438 mission ENS-IFAN aux Monts Loma, 2♂, 1♀ (MNHN). Firawa, savane [savannah],
439 1.vi.1963, mission ENS-IFAN aux Monts Loma, 1♂, 1♀ (MNHN). Njala, E. Hargreaves:
440 21.vii.[19]32, B.M. 1938-149, identified *X. eneopteroides* Bol. by L. Chopard, pres Imp.
441 Inst. Ent. Brit. Mus. 1965-474 (NHMUK 010926552); x.1936, 1♂, pres Imp. Inst. Ent.
442 Brit. Mus. 1965-474, 1♂, identified *Xenogryllus eneopteroides* by B. Uvarov (NHMUK
443 010926534); 23.v.[19]25, 1♂, identified *X. eneopteroides* Bol. by L. Chopard, B. M.
444 1938-149 (NHMUK 010926530); xi.1935, 1♂, pres Imp. Inst. Ent. Brit. Mus. 1936-252,
445 1♂, identified *Xenogryllus eneopteroides* by B. Uvarov (NHMUK 010926576). **Uganda:**
446 Entebbe, 20.xi.1970, W.J. Bailey, B.M.1977-246, identified *Xenogryllus eneopteroides*
447 by B. C. Townsend, 1978 (NHMUK 010926570). Kisaru, 19.vii.1983, 1♂, H.B. Johnson,
448 at light (NHMUK 010926551). **Zambia:** Lusaka, about fifty metres from the Great East
449 Road in Chalimbana, Chongwe Distr., 19.xii.2013, William van Niekerk, 1♂, identified
450 *X. eneopteroides* by William van Niekerk [online photograph]. Kapiri, 13.xi.1913, 2♀, L.
451 Charliers, Musée du Congo, identified *Xenogryllus eneopteroides* by L. Chopard, R.
452 Det. N 2814 (MRAC).

453 *Type locality.* Angola, Duque de Bragança, Bayão (=Kalandula).

454 *Distribution.* Sub-Saharan Africa: Angola, Benin, Cameroun, Central African Republic,
455 Democratic Republic of the Congo, Gabon, Ivory Coast, Kenya (one large female
456 specimen with unclear identification), Nigeria, Republic of Congo, Sierra Leone,
457 Uganda, Zambia.

458 *Emended diagnosis.* Species of average size, close to *X. mozambicus* n. sp. and *X.*
459 *maniema* n. sp., from which it differs by face almost flat in lateral view (more rounded in
460 other species), shorter male FWs (short apical field), and shape of lophi in male
461 genitalia. Differing from *X. lamottei* n. sp. and Asian species by following characters:
462 well-carinated lateral angles of dorsal disc of pronotum (also carinated in *X.*
463 *mozambicus* and *X. maniema*), very short ovipositor and male genitalia.

464 *Redescription.* Species of average size (Fig. 1A-C), coloration gray brown little
465 contrasted. Eyes large, lateral, occupying almost half of head height in lateral view (Fig.
466 3A-B). Face almost flat in lateral view, with typical whitish mask underlined by a black
467 line below eyes and on mandibles. Pronotum dorsal disc strongly carinated laterally
468 (Fig. 3B), coloration dark brown or brown, most often with a median dark brown band
469 extended laterally near anterior margin, forming a T shape; lateral lobes almost
470 homogeneously dark brown. First article of antennae dark brown.

471 *Male.* FWs very wide, dark coloration anterior to 1A including angle of 1A (Fig. 5A). File
472 with 658 stridulatory teeth (n=2) on transverse part of 1A. Harp longer than wide. Cell
473 c1 narrowed posteriorly, its fusion with cell b1 slightly shorter than its individualised
474 part. Cell c2 large, d2 long and narrow. Mirror large, wider than long and little rounded,
475 its inner angle forming an angle. Apical field short, wider than long, including four or
476 five cell alignments.

477 *Male genitalia* (Figs 7A-C, 8A-B). Pseudepiphallic lophi as long as rest of
478 pseudepiphallic sclerite, forming a long rectangle, sometimes slightly widened
479 preapically; lophi with a narrow membranous inner margin setose basally (Fig. 8A-B);
480 their bases fused until mid-length; apex pointed and divergent, ended by a thin lamella
481 without hook-like inner dorsal expansion (in dorsal view, anterior base of lamella
482 suggests that lamella may partly correspond to modified inner dorsal expansion of
483 other species); ventral blade of lophi without longitudinal wrinkles, but with a strong
484 ventral transverse carina, as in *X. mozambicus* n. sp. Pseudepiphallic parameres with

485 a strong rectangular ventral lobe and a basal membranous lobe. Rami strong, their
486 apex forming wide convergent hooks. Ectophallic apodemes strong, not lamellate.
487 Ectophallic lateral expansions, lateral sclerites of ectophallic fold and endophallic
488 sclerite partly fused, forming a wide ventral sclerotized plate, trifid apically; endophallic
489 apodemes made of wide lateral lamellas and a narrow dorsal crest.

490 *Female* (Fig. 1C). Dorsal disc of pronotum almost rectangular, its posterior margin
491 slightly bisinuate. FWs dorsal field with 7-10 longitudinal veins (m=8, n=10). Subgenital
492 plate with a shallow apical indentation (Fig. 9A). Ovipositor (Fig. 10A) very short, about
493 one third of FIII length.

494 *Female genitalia*. Copulatory papilla (Fig. 11A-B) conical and narrow, its apex rounded;
495 well-sclerotized except base and apex.

496 *Life history traits*. According to Chiffaud & Gillon (1984), *X. eneopteroides* is found in
497 Ivory Coast at the end of the dry season, in parts of savannah protected from fires.
498 Their study revealed that the species feeds only on leaves and flowers of dicotyledones
499 which are specific to savannah.

500 *Calling song*. According to the sonogram showed in Desutter (1983), analysed by
501 Robillard & Desutter-Grandcolas (2004a, 2011), the calling song of *X. eneopteroides* is
502 a short echeme made of five long syllables (syllable duration = 65 ms, period = 106.5
503 ms. Echeme duration = 611 ms, echeme period = 1062 ms. The dominant frequency is
504 low (3.6 kHz) and corresponds to the first peak of the spectrum.

505 *Measurements*. See Table 2.

506 *Taxonomic discussion*. The material examined reveals numerous slight differences in
507 male genitalia (Fig. 8A-B) and size along the wide geographic distribution of the
508 species. In particular, specimens from Congo differ from the material from the western
509 coast of Africa. However, these differences are not sufficiently clear or are based on

510 too few individuals to delimit different species yet. More information and sampling will
511 be necessary to improve the study *Xenogryllus* in Africa.

512

513 ***Xenogryllus carmichaeli* (Chopard, 1928)**

514

515 *Dionymus carmichaeli* Chopard, 1928: 30.

516 *Xenogryllus carmichaeli* – Chopard 1968: 350; Yin & Liu 1995; Cigliano *et al.* 2018
517 (Orthoptera Species File Online).

518 *Madasumma carmichaeli* – Chopard 1969: 311.

519 *Nomen dubium* – this study.

520

521 *Taxonomic discussion.* According to the description of Chopard (1928), the female of
522 *X. carmichaeli* is similar to *X. marmoratus* in terms of shape, size and coloration.
523 However, the male specimen described by Chopard possesses five oblique veins,
524 which is not consistent with any other existing species of *Xenogryllus*, as noted by
525 Chopard himself. It is probable that the type series was heterogeneous, the male
526 belonging to another subfamily than Eneopterinae. The male type may belong to the
527 genus *Madasumma*, according the subsequent identification of the species by Chopard
528 (1969), while the female could belong to *X. marmoratus*. The type locality, “India,
529 Darjeeling District, alt. 100-300 ft, West Bengal”, could fit with *X. marmoratus*, but also
530 *X. transversus* or *X. maichauensis*. Given these problems and the fact that the type
531 series is missing in ZSI, Kolkata (RJ, pers. obs.), we consider this species as *nomen*
532 *dubium*.

533

534 ***Xenogryllus lamottei* Robillard n. sp.**

535 (Figs 1H-I; 3C-D; 4B; 5B; 7D-E; 8C)

536

537 *Type material. Holotype*, ♂, **Guinea**: Simandou [Mount], Guinée [Guinea], Cpt.[camp]
538 Fon Yenfédou, Ifan [Institut Français d'Afrique Noire], ix.1951, [M.] Lamotte (MNHN-
539 EO-ENSIF10685).

540 *Type locality*: Mount Simandou, Guinea.

541 *Distribution*. Species only known from the type locality in Guinea.

542 *Etymology*. The species is dedicated to the great French entomologist Marcel Lamotte
543 who collected the type specimen.

544 *Diagnosis*. Species of average size, characterized by male FWs not widened as in
545 other species of the genus; general morphology differing from the other African species
546 (*X. eneopteroides*, *X. mozambicus* n. sp. and *X. maniema* n. sp.) and more similar to
547 the Asian species (*X. marmoratus*, *X. transversus*, *X. ululiu* and *X. maichauensis*) by
548 the following characters: pronotum not carinated laterally (Fig. 3D); wrinkles on surface
549 of male FWs weak; eyes small, restricted to dorsal quarter of head (reaching ½ of head
550 in other African species); face almost flat in lateral view; male genitalia with short
551 pseudepiphallic lophi (Fig. 8C), close to that of *X. ululiu* (Fig. 8H), their apex short and
552 bifid, with a pre-apical dorsal hook-like expansion (absent in other African species);
553 ectophallic fold and latero-ventral expansions shorter than in other species.

554 *Description*. In addition to the characters of the genus, species of average size (Fig.
555 1H-I), coloration gray brown little contrasted. Fastigium longer than wide, thinner than
556 in other species (Fig.4B), slightly widened apically. Face almost flat in lateral view (Fig.
557 3D), with typical pale mask with black spots underlined by a thick black line below eyes
558 (Fig. 3C); mandibles dark brown; clypeus and labrum mottled with yellow and dark
559 brown; maxillary palpi dark brown. Scapes and first article of antennae dark brown,

560 flagellum light brown. Eyes rounded and restricted to posterior quarter of head in lateral
561 view. Pronotum dorsal disc not carinated laterally (Fig. 3D), brown, with lateral margins
562 underlined by a yellow line, with a median dark brown band, ticker posteriorly; posterior
563 margin almost straight. FIII narrow, ended by a long linear region. Abdomen slightly
564 shorter than FWs. Cerci dark brown.

565 *Male*. FWs as wide as abdomen (Fig. 5B), not widened as in other species of the
566 genus; light brown, translucent, with weak wrinkles on surface. Dark coloration anterior
567 to 1A not including angle of file. CuP visible posteriorly until angle of 1A. Angle of 1A
568 straight. Harp wide, with two straight parallel oblique veins and a partial one, straight
569 and reaching harp mid-length. Cell c1 not narrowed posteriorly. Mirror almost rounded,
570 its inner limit forming a curve; underlined posteriorly by cells e1 and d2 fused together.
571 Apical field forming a narrow triangle made of four cell alignments (E-H). CuA thin and
572 brown; M thick, whitish; R and Sc almost fused, brown; M-R area dark mostly brown, its
573 dorsal margin whitish; lateral field translucent brown crossed by 22 projections of Sc.

574 *Male genitalia* (Fig. 7D-E). Pseudepiphallic lophi forming a short rectangle posterior to
575 wide base of pseudepiphallic sclerite; lophi (Fig. 8C) with a narrow membranous inner
576 margin, setose basally; apex with a black hook-like inner dorsal expansion; sclerotized
577 ventral blades of lophi with longitudinal wrinkles as in *X. transversus* and *X. ululiu*, but
578 without strong ventral carina as in *X. eneopteroides* and *X. mozambicus*.
579 Pseudepiphallic lateral membranous lobes small. Pseudepiphallic basal margin
580 reinforcement weak. Rami thin and straight, their apex narrowed but not hooked
581 innerly. Pseudepiphallic parameres ventral plate r-shaped,. Ectophallic arc not
582 sclerotized. Ectophallic apodemes thin and divergent. Ectophallic fold and latero-dorsal
583 expansions short. Endophallic sclerite and apodeme little differentiated.

584 *Female*. Unknown.

585 *Life history traits*. Unknown.

586 *Calling song*. Unknown.

587 *Measurements*. See Table 3.

588

589 ***Xenogryllus maichauensis* Gorochov, 1992**

590 (Figs 1L-O; 3E-F; 4C; 5C; 7L-N; 8D; 9C; 10B; 11E-G; 12A; 13)

591

592 *Xenogryllus maichauensis* Gorochov, 1992: 9 – Kim & Pham 2014: 60; Cigliano *et al.*
593 2018 (Orthoptera Species File Online).

594 *Xenogryllus transversus* – Yin & Liu 1995: 96; Robillard *et al.* 2007: 1267 (song
595 frequency, wrong identification); He 2018: 516; Cigliano *et al.* 2018 (Orthoptera
596 Species File Online) (wrong identification).

597

598 *Type material*. *Holotype*, ♂, **Vietnam: Mai Châu** (ZIN) [examined through photographs
599 sent by A. Gorochov].

600 *Additional material examined*. **China: Yunnan**, Mengla, E101°33' N21°28', 3.ix.1991,
601 Zuyao Liu, Tianqi Wang & Heisheng Yin: 1♂ (14062446), 2♀ (14062547, 14062622)
602 (SIPPE). Mengla Distr., 12-23.x.2014, coll. Zhang Tao, 14♂, 2♀, (SNNU). San Chahe,
603 Mongyang, E98°22' N25°23', 31.vii.1995, Xianwei Liu, Weinian Zhang, Xingbao Jin, 1♂
604 (14062620) (SIPPE). Xi Shuang Ban Na, 580 m, 10.ix.1993, Xinyue Chen, 3♂,
605 (14064963, 14064964, 14064966); 2♂, 7.ix.1993 (14064968, no number); 1♂,
606 5.ix.1993 (14064967) (SIPPE). Monglun Xi Shuang Ban Na, E101°15' N21°56',
607 5.ix.1993, Longlong Yang, 2♀, (14064969, 14064971); 7.ix.1993, Xinyae Chen, 1♀
608 (14064970) (SIPPE). Jinhong, E101°15' N21°56', Zuyao Liu, Tianqi Wang, Heisheng
609 Yin: 6.ix.1991, 3♂ (14062619, 14062546, 14062448); 8.ix.1991, 1♂ (14062447)
610 (SIPPE). Jinhong, [N22°0'6.97" 100°46'25.07"E], 9.ix.1991, Zuyao Liu, Tianqi Wang,

611 Heisheng Yin, 1♀ (14062449) (SIPPE). Mohan Vill., 950 m, 3-ix.2005, coll. Xue Guoxi,
612 2♂ (NWAUFU). **Guangdong**, Shen zhen, [22°33'59.69"N, 114° 2'25.53"E], 9.x.2012,
613 Zhang Tao [online photograph]. **Thailand: Tak**, Doi Musoe, 700 m, Agric. Res. Stn at
614 night, 9.x.1990, S. Ingrish: 1♀, 1♂, molecular sample XtrTh, identified *Xenogryllus*
615 *transversus* by S. Ingrish (ZFMK). Mae Salid, Monkrathing, 17° 30' N, 98° 5' E, 700 m,
616 19.ix.1989-21.ix.1989, S. Ingrisch, 1♂, mountain forest and agricultural land [day
617 collecting and night collecting following stridulation, Stridulation recorded by S.Ingrisch
618 0295DXEN.WAV [old ID CIGxentraSW03], identified *Xenogryllus transversus* by S.
619 Ingrish (ZFMK). Umphang, 1-6 km S., 15° 59' N, 98° 50' E, 16.x.1991, S. Ingrisch, 1♂,
620 bamboo forest, along road and trails, stridulation recorded by S. Ingrisch
621 0510XENO.WAV, identified *Xenogryllus transversus* by S. Ingrish (ZFMK). **Chiang**
622 **Mai**, Roadside bw Samoeng and Mae Rim, 18° 50' N, 99° 0', 1♂, 11.x.1991, S.
623 Ingrisch, 1♂, stridulation recorded by S. Ingrisch 0502XENO.WAV, [old ID
624 CIGxentraSW05], roadside at night, identified *Xenogryllus transversus* by S. Ingrish
625 (ZFMK). **Petchabun**, Nam Nao, 16° 47' N, 101° 27' O, 1000 m, S. Ingrisch; 13.ix.1989-
626 14.ix.1989, S. Ingrisch, 1♂, stridulation recorded by S. Ingrisch 0286XENO.WAV [old
627 ID CIGxentraSW01], mixed Oak-Pine forest, grassy undergrowth, Bamboo thicket [day
628 collecting and night collecting following stridulation], identified *Xenogryllus transversus*
629 by S. Ingrish (ZFMK).

630 *Type locality.* Mai Châu, Vietnam.

631 *Distribution.* Southern China, Northern Vietnam and Northern Thailand.

632 *Emended diagnosis.* Species of large size, similar in size, venation and coloration to *X.*
633 *transversus*, from which it differs mostly by male genitalia, with pseudepiphallic lophi
634 forming curved elongate hooks widened apically (Fig.8D), while lophi are straight in *X.*
635 *transversus* (Fig. 8I).

636 *Redescription.* In addition to the characters of the genus, *X. maichauensis* has a large
637 size and a light brown or golden coloration (Fig. 1L-O). Fastigium slightly widened

638 apically as in *X. ululiu* and *X. transversus* (Fig. 4C). Eyes rather small, located on face,
639 restricted to the dorsal third of head in lateral view (Fig. 3E-F). Lateral angle of dorsal
640 disc of pronotum not carinated, with a thin yellow band underlined by a thin black line
641 anteriorly. Hind wings tail gray brown, twice as long a pronotum.

642 *Male*. Pronotum dorsal disc more rectangular than in *X. transversus*, with a wide
643 median black longitudinal band, its posterior margin slightly bisinuate. FW venation
644 (Fig. 5C): 1A forming a straight angle, with 299 stridulatory teeth (n=1) located on
645 transverse part of 1A. Dark coloration anterior to 1A not including angle of file. Harp
646 wide. Mirror large, well-rounded, its inner limit curved. Apical field forming a triangle
647 longer than wide, with six cell alignments.

648 *Male genitalia* (Fig. 7L-N). Characteristic Y-shaped pseudepiphallic lophi forming
649 curved elongate hooks, widened apically, with a sharp dorsal preapical expansion (Fig.
650 8D). Rami strong, convergent apically, with a ventral posterior expansion reaching
651 base of pseudepiphallic lateral membranous lobes. Ectophallic apodemes long and
652 thin. Ectophallic fold and endophallic sclerite almost fused, forming a wide sclerotized
653 plate, trifurcate posteriorly; endophallic apodemes made of wide lateral lamellas.

654 *Female*. Head slightly wider than pronotum, with strong jaws visible from dorsal view
655 (Fig. 1N-O). Dorsal disc of pronotum almost rectangular, its posterior margin slightly
656 bisinuate. FWs light brown, anterior dark spot larger than in *X. ululiu*, *X. transversus*
657 and *X. marmoratus*. Dorsal field with nine strong longitudinal veins. Subgenital plate
658 with a V-shaped apical indentation with rounded edges (Fig. 9C). Ovipositor (Fig. 10B)
659 as long as FIII.

660 *Female genitalia*. Copulatory papilla (Fig. 11E-F) conical, its apex rounded and
661 sclerotized.

662 *Life history traits*. In Vietnam, the type specimens were found in forest, on leaves of
663 bushes near a stream (A. Gorochoy, pers. comm.). According to the information

664 associated with the recordings made by S. Ingrish in Thailand (available on the
665 Orthoptera Species Files online under the name *X. transversus* (Cigliano *et al.* 2018),
666 the species was found in mixed oak-pine forest on grassy undergrowth with bamboo
667 thicket. Males call at night on vegetation.

668 *Calling song.* (Figs 12A, 13) *X. maichauensis* was recorded in Thailand by S. Ingrish
669 (Cigliano *et al.* 2018). At 24.5°C, the calling song is made of short echemes quickly
670 repeated and composed of 2-4 long syllables ($m = 3.02 \pm 0.63$), lasting for 179.5 ± 41.6
671 ms, with a period of 502 ± 42 ms. Within echemes, the first syllable has a lower
672 amplitude than the next ones. Syllables are rather long (duration = 46.5 ± 1.7 ms) with
673 a syllable period of 65.1 ± 1.7 ms (syllable duty cycle = 71%). The frequency spectrum
674 shows a dominant frequency at 4.91 ± 0.07 kHz followed by two powerful harmonics.

675 *Measurements.* See Table 4.

676 *Taxonomic discussion.* The male genitalia of the specimen from Thailand shows
677 slightly different pseudepiphallic lophi compared to the holotype from Vietnam and
678 examined males from China, with more straight apical branches and less globular apex
679 (Fig. 7L-M). Such differences are however based on too few observations to
680 characterise a new species.

681

682 ***Xenogryllus maniema* Robillard & Jaiswara n. sp.**

683 (Figs 1J-K; 3G-H; 4D; 5D; 7F-G; 8E)

684

685 *Type material.* *Holotype*, ♂, **Democratic Republic of the Congo:** Lokandu, île [island]
686 Biawa, vii.1939, Lt. Vissers, coll. Mus. Congo (MNHN-EO-ENSIF10686). *Paratypes*
687 (5♂), **Democratic Republic of the Congo:** same information as holotype; 3♂,
688 identified *Xenogryllus eneopteroides* by L. chopard, R. Det. B.5318 (MRAC). Katanga:
689 Kafakumba, ix.1924, 1♂, G. F. Overlaet, coll. Musée du Congo, identified *Xenogryllus*

690 *eneopteroides* by L. Chopard, R. Det. N 2814 (MRAC). Congo Belge, Musosa
691 [Mususa], ix.1939, H. J. Brédo, 1♂, I.G.13.212 (RBINS).

692 *Type locality.* Democratic Republic of the Congo, Lokandu, island Biawa.

693 *Distribution.* Species only known from forested areas in the eastern part of the
694 Democratic Republic of the Congo.

695 *Etymology.* The species is named after the type locality. Maniema, which means
696 “jungle” or “rain forest” in Kibangubangu dialect, is one of 26 provinces of the
697 Democratic Republic of the Congo.

698 *Diagnosis.* Species of average size, closer to *X. mozambicus* n. sp., from which it
699 differs by less rounded face in lateral view (Fig. 3H), pseudepiphallid lophi (Fig. 8E)
700 ended by a long conical apex and with a widened inner membranous margin
701 resembling that of in *X. maichauensis*. From *X. eneopteroides* and *X. mozambicus*, *X.*
702 *maniema* differs by absence of T-shaped median band on pronotum, absence of
703 transverse carina on ventral face of lophi, and by rami weak, without convergent hook-
704 like apex. Differing from *X. lamottei* n. sp. and Asian species by strongly carinated
705 lateral angles of pronotum dorsal disc (also carinated in *X. mozambicus* and *X.*
706 *eneopteroides*).

707 *Description.* Species of average size, coloration yellow brown little contrasted (Fig. 1J-
708 K). Eyes large, lateral, higher than long, occupying almost half of head height in lateral
709 view (Fig. 3G-H). Face well-rounded in lateral view (less than in *X. mozambicus*), with
710 typical whitish mask underlined by a black line below eyes and on mandibles.
711 Pronotum dorsal disc strongly carinated laterally (Fig. 3H), coloration light brown, with a
712 median dark brown band, not extended laterally near anterior margin; lateral lobes
713 almost homogeneously brown. First article of antennae dark brown.

714 *Male.* FWs very wide (Fig. 5D), longer than abdomen; dark coloration anterior to 1A
715 including angle of 1A. FW venation as in *X. eneopteroides*; apical field longer, forming

716 a long triangle made of five (n=2) cell alignments.

717 *Male genitalia* (Fig. 7F-G). Pseudepiphallic lophi twice longer than rest of
718 pseudepiphallic sclerite; with a wide membranous inner margin (Fig. 8E); their bases
719 fused until mid-length. Apex of lophi long and pointed, slightly convergent and ended
720 by a thin lamella, without inner dorsal expansions. Ventral blade of lophi with faint
721 longitudinal wrinkles, but without strong transverse carina as in *X. eneopterooides*.
722 Pseudepiphallic parameres with a strong rectangular ventral lobe. Rami rather weak,
723 their apex almost straight, not forming convergent hooks. Ectophallic apodemes strong,
724 not lamellate. Ectophallic lateral expansions, lateral sclerites of ectophallic fold and
725 endophallic sclerite partly fused, forming a wide ventral sclerotized plate, trifid apically;
726 endophallic apodemes made of wide lateral lamellas and a narrow dorsal crest.

727 *Female*. Unknown.

728 *Life history traits*. Unknown.

729 *Calling song*. Unknown.

730 *Measurements*. See Table 5.

731

732 ***Xenogryllus marmoratus* (Haan, 1844)**

733 (Figs 1D-G; 3I-J; 4E; 5E; 7H-I; 8G; 9B; 11CD; 12B; 14)

734

735 *Gryllus (Phalangopsis) marmoratus* Haan, 1844: 235.

736 *Calyptotrypus marmoratus* – Saussure 1878: 714 (the figures do not correspond to the
737 species *X. marmoratus*, which is consistent with the surprising distribution “Java, Iles
738 de la Sonde” proposed by Saussure, where the species is not distributed); Bolívar
739 1900[1899]: 805.

740 *Madasumma marmorata* – Chopard 1924: 56; Kirby 1906: 93.

741 *Xenogryllus marmoratus* – Chopard 1968: 350; Yin & Liu 1995: 96; Oshiro 1995: 43;
742 Walker 2010: 27; Robillard & Desutter-Grandcolas 2004a: 578 (calling song); 2004b:
743 273 (morphological phylogeny); 2006: 644 (molecular phylogeny); 2008: 67; 2011: 637;
744 Anso *et al.* 2016: 9 (molecular phylogeny); Chintauan-Marquier *et al.* 2016: 62
745 (molecular phylogeny); Vicente *et al.* 2017: 2203 (historical biogeography); Schneider
746 *et al.* 2017 (tympanum morphology).

747 *Xenogryllus marmoratus marmoratus* Gorochov, 1992, in Gorochov & Belokobylskij
748 1992: 11 (nominal subspecies); Ichikawa *et al.* 2000: 276; 2006: 180; Storozhenko &
749 Paik 2007; Storozhenko *et al.* 2015: 145; Cigliano *et al.* 2018 (Orthoptera Species File
750 Online); Olivero & Robillard 2017: 1 (mating behavior).

751 *Xenogryllus marmoratus unipartitus* (Karny, 1915) – Gorochov & Belokobylskij 1992:
752 10 (subspecies).

753 Synonym names:

754 *Heterotrypus unipartitus* Karny, 1915 – Chopard, 1968: 350.

755 Common names: Pine cricket (English), matsumushi (Japanese = pine insect, waiting
756 insect); bao ta ling (Chinese = pagoda bell).

757

758 *Type material. Neotype*, ♂ [new designation], **Japan: Honshu**, collection Finot,
759 identified *Calypotrypus species nova* by A. Finot (MNHN-EO-ENSIF1592).

760 *Additional material examined. Japan: Honshu*, Mie, ix.1957, F. Ohmachi, 1♂, 1♀,
761 identified *Xenogryllus marmoratus* de Haan, Xma Robillard morpho (MNHN). Japon,
762 1♀, Exposition Universelle 1869, #1276-69, identified *Dionymus marmoratus* by L.
763 Chopard (MNHN-EO-ENSIF1593). Japon [Japan, no precise locality and date], 1♂, 1♀,
764 identified *Dionymus marmoratus* by L. Chopard, Xma Robillard morpho; 1♂, 2♀
765 (MNHN); 1♀ (NHMW); 1♂, 20.679, identified *X. marmoratus unipartitus* by Karny
766 (NHMW); 4♀, identified *Calypotrypus species nova*, collection Finot (MNHN). Kobe, H.

767 Fruhstorfer, 1♀, 24.125 (NHMW). Kyoto, I. Yamashiro, 1♂, Xma Robillard morpho
 768 MEB, MEB Ziegler; 1♀; 1♀, molecular sample T. Robillard 2004 (MNHN). Kioto
 769 [Kyoto], Y. Hirase, 1♂, identified *Madasumma marmorata* (Haan) and *Calyptotrypus*
 770 *marmoratus* (Haan) by Hebard, 1924 (MNHN). Kanagawa Prefecture, Kanate, Ooi-Cho
 771 Ashigara-kami-gun [35° 23' 00"N, 139° 08' 00"E], H. Sakai, 14.viii.2010, 1♂, 2♀, 1
 772 juvenile, identified *Xenogryllus marmoratus* by A. Ichikawa (MNHN); 1♂,
 773 enregistrement appel TR-male2 [call recording - MNHN-SO-2016-14364], identified
 774 *Xenogryllus marmoratus* by A. Ichikawa (MNHN-EO-ENSIF1704); 1♂, enregistrement
 775 appel TR-male1 [call recording, MNHN-SO-2016-14365], identified *Xenogryllus*
 776 *marmoratus* by A. Ichikawa (MNHN-EO-ENSIF1598). Japon, environs de Tokyo, J.
 777 Harmand, 1906 (MNHN). Kinki Distr.[ict], Wakayama Pref.[ecture], Hashimoto city,
 778 19.x.1986, A. Ichikawa, 1♂, identified *X. marmoratus* by A. Ichikawa (RBINS).
 779 **Tsushima**, H. Fruhstorfer, sept-oct [ix-x], 24.123 (NHMW). **China: Guanxi**, Jin Xiu,
 780 10.x.1981, E110°11' N24°07', 1♀ (14062635) (SIPPE). Longzhou, 1995-viii18/23,
 781 Xianwei Liu, Weinian Zhang, Xinbao Jin, 1♀ (14062635) (SIPPE). **Chongqing**, Beibei,
 782 E106°23' N29°48', 1.x.2000, Zhou, 1♂ (14080765) (SIPPE). **Anhui**, Huangshan,
 783 E118°19' N29°43' [Shanghai market], viii.2012, T. Robillard, 1♂ (TR40),
 784 enregistrement appel [call recording MNHN-SO-2018-36] (MNHN-EO-ENSIF1702); 1♂
 785 (TR2), enregistrement appel [call recording MNHN-SO-2018-52], molecular sample
 786 X12 (MNHN-EO-ENSIF1594). **Jiangsu**, Zhenjiang, 32°12'0.00"N 119°27'0.00"E
 787 [Shanghai market], viii.2012, T. Robillard, 1♂ (TR41), enregistrement appel [call
 788 recording, MNHN-SO-2018-38] (MNHN-EO-ENSIF1707); 1♂ (TR3), enregistrement
 789 appel [call recording MNHN-SO-2018-], molecular sample X13 (MNHN-EO-
 790 ENSIF3562). **Shanghai**, Padang Shanghai, E121° 32' N31° 13' [Shanghai market],
 791 viii.2012, T. Robillard, 1♂, molecular sample X11, enregistrement appel [call recording,
 792 MNHN-SO-2018-37] (MNHN-EO-ENSIF1599); 1♂ (MNHN). Shanghai, Prov. Klange[?],
 793 Musée Meude, O. Piel, 30.viii.[19]30, 1♀, #1623, 1♂, 6.ix.[19]30 (MNHN).
 794 **Guangdong**, Shenzhen Distr., Xichong, 27.ix.2014, coll. Zhang Tao, 4♂, 2♀ (SNUU).

795 **Henan**, Xinxian Distr., 4-8.ix.2014, coll. Ma Libin, 2♀ (SNNU). **Hainan**, Wuzhishan Mt.,
796 12;viii.2010, coll. Jiang Chaozhong, 1♂ (NWFU). **Zhejiang**, Tianlongshan Mt.,
797 8.vii.2009, coll. He Zhuqing, 1♂ (ECNU). **Shaanxi**, Ankang, 10.viii.2017, coll. Ma Libin,
798 1♂ (SNNU). **Taiwan**, Takao, Formosa, Sauter XI.[19]07, type of *Heterotrypus*
799 *unipartitus*, det. Karny, identified *Dionymus formosanus* n. sp. Type by T. Shiraki, (DEI,
800 Eberswalde), identified *Xenogryllus marmoratus unipartitus* (Karny) by A. V. Gorochov
801 (DEI) [examined on photo]. **Sri Lanka**: Ceylon, Kandy, H. Rolle Berlin SW.11, 1♂
802 (MNHN). **South Korea**: data from website “South Korea: Orthopteroids of Korea”
803 (<http://www.jasa.pe.kr/pulmuchi/korthoptera/Xenogryllus-marmoratus.htm>).

804 *Distribution*. Japan, China (including Taiwan and Hainan), South Korea
805 (<http://www.jasa.pe.kr/pulmuchi/korthoptera/Xenogryllus-marmoratus.htm>), India
806 (specimens observed by Chopard (1969)), Sri Lanka (1 male specimen).

807 *Emmended diagnosis*. Species characterised by its small size (Fig. 1E-G), head dorsal
808 coloration with a faint median dark band on vertex, and male genitalia with very long
809 and thin pseudepiphallic lophi (Fig. 8G); in male FWs (Fig. 5E), mirror wider than long,
810 less rounded than in *X. maichauensis*, *X. ululiu* and *X. transversus*.

811 *Redescription*. Species of small to average size, the smallest for the genus (Fig. 1E-G).
812 Coloration almost homogeneously light ochre. Median dark band on head dorsum faint
813 on vertex (Fig. 4E), prolonged anteriorly by black fastigium, with three narrow lateral
814 bands on each side. Fastigium straight, not widened anteriorly. Antennae light brown,
815 first segment darker. Face relatively flat in lateral view (Fig. 3J). Pronotum dorsal disc
816 light brown, with a median brown band variably marked prolonging head coloration;
817 lateral margins not carinated, with a narrow yellow line; lateral lobes ochre,
818 progressively lighter ventrally.

819 *Male*. FWs light brown, translucent (Fig. 5E); dark coloration anterior to 1A sometimes
820 extended on angle of 1A. Transverse part of file almost straight, with 435 stridulatory
821 teeth (n=1) on transverse part of 1A. Harp as wide as long. Fused part of cells c1 and

822 b1 as long as individualised part of c1. Cell d2 wider than in other species. Mirror wider
823 than long, little rounded, its inner limit forming a wide angle. Apical field short, including
824 five cell alignments.

825 *Male genitalia* (Fig. 7H-I). Pseudepiphallic sclerite longer than rami; pseudepiphallic
826 lophi very long (Fig. 8G), narrow and sclerotized, slightly convergent, ended by an
827 apical lamella curved dorsally and forming a small notch. Pseudepiphallic sclerite with
828 wide lateral membranous lobes. Basal reinforcement of pseudepiphallic sclerite strong.
829 Rami short with convergent hook-like apex. Pseudepiphallic parameres with a ventral
830 transverse crest absent in other species; inner apex of of pseudepiphallic parameres
831 sharp, slightly sclerotized apically. Ectophallic apodemes strong, not lamellate.
832 Ectophallic lateral arms strong, fused to lateral arms of ectophallic fold, and with lateral
833 arms of endophallic sclerite, forming together a wide gutter. Ectophallic fold entirely
834 sclerotized ventrally. Endophallic sclerite small, apodeme made of a thin anterior dorsal
835 crest and narrow lateral lamellas.

836 *Female*. FWs dorsal field with 8-9 strong longitudinal veins ($m = 8$, $n = 10$) and faint
837 transverse ones. Subgenital plate not indented apically (Fig. 9B). Ovipositor longer
838 than FIII, its apex rounded and smooth.

839 *Female genitalia*. Copulatory papilla (Fig. 11C-D) thin and conical, widened basally;
840 sclerotization strong basally and apically, its membrane plicate.

841 *Life history traits*. *X. marmoratus* lives on low vegetation in bushes and grass in
842 secondary habitats and along roads. The species has a nocturnal activity; males call at
843 night from the vegetation. See Olivero & Robillard (2017) for description of peculiar
844 mating behaviours.

845 *Calling song* (Figs 12B, 14). At 26.5°C, the calling song of *X. marmoratus* is made of
846 relatively long syllables, each corresponding to one FW closure. Syllables form a two-
847 part echeme: 1-3 singleton syllables ($m = 2$, $n = 10$), followed by a chirp made of three

848 syllables, sometimes duplicated. The amplitude profile of the call shows that the
849 singletons are usually less loud than the chirp. Total echeme duration is 711 ± 33 ms,
850 for an echeme period of 6776 ± 368 ms (echeme duty cycle = 10.5%). The syllables
851 have the following characteristics: 1st syllable duration = 51.8 ± 1.5 ms (period = 318.3
852 ± 35.6 ms); 2nd syllable duration = 50.3 ± 1 ms; chirp duration = 183.8 ± 1 ms; chirp
853 syllable duration = 49.5 ± 1.9 ms (period = 68 ± 0.8 ms). The frequency spectrum
854 shows a pure tone fundamental peak corresponding to the dominant frequency at ca.
855 5.9 ± 0.2 kHz, with a clear harmonic series, the third harmonic (ca. 18 kHz) being
856 almost as powerful as the fundamental peak.

857 *Measurements.* See Table 6.

858 *Taxonomic discussion.* The types of De Haan, supposed to be in Leiden, were not
859 found in RMNH in 2006 (TR, pers. obs.), with no record mentioning them as loaned
860 (Rob De Vries, curator of the Orthopteran collection in RMNH, pers. com. 2006;
861 confirmation by Luc Willemse, current curator of the Orthopteran collection in RMNH,
862 pers. com. 2018). Specimens possibly belonging to the original type series were also
863 searched for in other European museums, but could not be found. We thus designate a
864 neotype from Japan that will serve as a reference for future systematic works.

865 Gorochov (1992) distinguished two subspecies, *X. m. marmoratus* (Haan, 1844) and *X.*
866 *m. unipartitus* (Karny, 1915). In his study, he considered *Gryllus* (*Phalangopsis*)
867 *marmoratus* Haan, 1844 (type from Japan), as the nominal subspecies *Xenogryllus*
868 *marmoratus marmoratus*, while he established the subspecies *X. m. unipartitus* based
869 on the species *Heterotrypus unipartitus* Karny, 1915, which was described from one
870 female from Taiwan (Takao, examined on photo). The type of *H. unipartitus* clearly
871 corresponds to a female of *Xenogryllus*, however, given the continuous variation
872 observed across the wide distribution of *X. marmoratus*, and the limited information
873 available based on female morphology, there is no reason to maintain these two
874 subspecies. We thus synonymise the subspecies under *X. marmoratus*, and *H.*

875 *unipartitus* becomes a junior synonym of *X. marmoratus*, as previously proposed by
876 Chopard (1968).

877

878 ***Xenogryllus mozambicus* Robillard n. sp.**

879 (Figs 2A-D; 3K-L; 4H; 5F; 7J-K; 8F; 9D; 11H-J; 12C; 15; 16)

880

881 *Xenogryllus eniopteroides* (wrong spelling of *X. eneopteroides*) – Toms 1984: 309.

882

883 *Type material. Holotype*, ♂, **Mozambique: Cabo Delgado**, Pantanos de Nhica, zone
884 herbacée à l'Est du camp [herbaceous area E of camp], 10°45'19,1"S 40°13'00"E, 122
885 m, 29.xi.2009, T. Robillard, nuit, enregistrement appel [call recording MNHN-SO-2018-
886 140] (TR475) (MNHN-EO-ENSIF1517). *Allotype*, ♀, **Mozambique: Cabo Delgado**,
887 mare SE de Nhica, bras mort de la Rovuma [pond SE Nhica, dead arm of Rovuma
888 river], 10°45'41,9"S 40°13'31,7"E, 124 m, 27.xi.2009, T. Robillard, mort en élevage
889 [dead in captivity], (MNHN-EO-ENSIF1539). *Paratypes* (8♂, 4♀): **Mozambique: Cabo**
890 **Delgado**, same information as holotype: 1♂, 1♀, morts en élevage [dead in captivity]
891 (MNHN-EO-ENSIF1576-ENSIF1556). Same information as allotype: 2♂, mort en
892 élevage [dead in captivity] (MNHN-EO-ENSIF1557, ENSIF1508). Mare SE de Nhica,
893 bras mort de la Rovuma [pond SE Nhica, dead arm of Rovuma river], 10°45'41,9"S
894 40°13'31,7"E, 124 m, nuit, zone herbacée en bord de piste [herbaceous area near
895 track] T. Robillard: 22.xi.2009, 1♂ (MNHN-EO-ENSIF1554), 3♀ (MNHN-EO-
896 ENSIF1502, ENSIF1503, ENSIF1505); 23.xi.2009, 1♂ (TR208), enregistrement appel
897 Take 224 [call recording MNHN-SO-2018-133] (MNHN-EO-ENSIF3079); 1♂ (TR206),
898 enregistrement appel Take 222 [call recording MNHN-SO-2018-134], molecular sample
899 X7-XenMoz (MNHN-EO-ENSIF1515). Mare SW de Nhica, bras mort de la Rovuma

900 [pond SW Nhica, dead arm of Rovuma river], 10°52'09,5"S 40°06'47,1"E, 122 m,
901 24.xi.2009, nuit, zone herbacée en bord de piste [herbaceous area near track] T.
902 Robillard: 1♂ (TR224), hautes herbes (h=1.3 m) [on high grass], enregistrement appel
903 Take 228 [call recording MNHN-SO-2018-135], molecular sample X23 (MNHN-EO-
904 ENSIF1559); 1♂, mort en élevage (MNHN-EO-ENSIF1581).

905 *Additional material examined.* **Mozambique: Delagoa** [Maputo Bay], xii.1898, 1 ♂,
906 identified *Phormincter* species nova by A. Finot (MNHN). **South Africa:** Zululand,
907 Mtunzini, 8.i.1952, R. Toms, 1♂, R146, identified *Xenogryllus eneopteroides* by B. C.
908 Townsend, 1984, B.M.1983-166 (NHMUK 010926568). **Malawi:** Fish Eagle Bay Lodge,
909 herbaceous area near lake Malawi (Mal7), S13°02'21.1" E34°19'34.8", 503 m,
910 6.x.2018, night, 2♂, call recording, 1♀, T. Robillard, K. Salazar & R. Murphy (MNHN).

911 *Type locality.* Mozambique, Cabo Delgado, Pantanos of Nhica, 10°45'19,1"S
912 40°13'00"E.

913 *Distribution.* Mozambique, South Africa, Malawi.

914 *Etymology.* Species named after the type locality.

915 *Diagnosis.* Species of average to large size, close to *X. eneopteroides* and *X. maniema*
916 n. sp. From *X. eneopteroides*, the new species differs by rather larger size, face more
917 rounded, almost globular in lateral view, absence of T-shaped median band on
918 pronotum (also absent in *X. maniema*) larger mirror, and slight differences in male
919 genitalia. From *X. maniema* n. sp., *X. mozambicus* mostly differs by male genitalia with
920 larger lophi (Fig. 8F) and presence of transverse carina on ventral face of lophi (also
921 present in *X. eneopteroides*). As *X. maniema* and *X. eneopteroides*, *X. mozambicus*
922 differs from *X. lamottei* n. sp. and Asian species by strongly carinated lateral angles of
923 pronotum.

924 *Description.* Species of average size (Fig. 2A-D), coloration light brown little contrasted.
925 Eyes little prominent laterally (Fig. 3K), higher than long, occupying almost half of head

926 height in lateral view. Face globular in lateral view (Fig. 3L), with typical whitish mask
927 underlined by a black line below eyes and on mandibles. Pronotum dorsal disc strongly
928 carinated laterally, coloration light brown, with a median dark brown band, not extended
929 laterally near anterior margin; lateral lobes almost homogeneously dark brown. First
930 article of antennae dark brown.

931 *Male*. FWs very wide, longer than abdomen; dark coloration anterior to 1A including
932 angle of 1A (Fig. 5F). Stridulatory file with 505 teeth (n=1) on transverse part of 1A. FW
933 venation as in *X. eneopteroides*, mirror wider and apical field longer, forming a long
934 triangle including 5-6 (n=8) cell alignments.

935 *Male genitalia* (Fig. 7J-K). Similar to *X. eneopteroides*, except longer pseudepiphallic
936 lophi (Fig 8F); transverse carina on ventral face of lophi present but weak.

937 *Female* (Fig. 2C-D). FWs dorsal field elongate, with 8-9 longitudinal veins (m = 9, n =
938 6). Subgenital plate with a shallow apical indentation (Fig. 9D). Ovipositor short, about
939 0.6 times FIII length.

940 *Female genitalia*. Copulatory papilla (Fig. 11H-J) as in *X. eneopteroides*, conical and
941 narrow, well-sclerotized except base and apex.

942 *Life history traits*. *X. mozambicus* lives in areas of wet savannah (Fig. 15). Individuals
943 of both sexes are found only at night in herbaceous vegetation, and males sing at night
944 from the vegetation (ca. 30-80 cm high). Toms (1984) demonstrated that this species
945 have directional calls and turn while calling, giving rise to changes in sound intensity.

946 *Calling song* (Figs 12C, 16). At 21.5 °C, males of *X. mozambicus* emit almost
947 continuously long bouts of highly musical calling songs. After a warming phase, call
948 bouts are made of successions of echemes of 23 ± 2 syllables, barely separated from
949 each other (echeme duration = 3.13 ± 0.29 s; echeme period 3.21 ± 0.30 s, echeme
950 duty cycle = 97.6 %), with a regular amplitude profile, except for the last syllable, which
951 is more intense. Within echemes, syllables are initially organized in 4 ± 1 doublets,

952 which are followed by a series of similar syllables. Syllables are very long (syllable
953 duration = 126 ± 5 ms), with a relatively short syllable period of 137 ± 8 ms (syllable
954 duty cycle = 92%). All syllables are characterized by a large amplitude modulation: in
955 initial doublets within echemes, the first syllables are less intense than the second ones
956 and they start with a lower amplitude than their end (initial amplitude < ending
957 amplitude), contrary to the second syllables of the doublets (initial amplitude > ending
958 amplitude); the rest of the syllables have a higher starting amplitude, except for the last
959 syllable of each echeme, which has a higher ending amplitude. The frequency
960 spectrum shows a pure-tone dominant frequency at 3.3 ± 0.01 kHz, followed by a rich
961 harmonic content including three powerful harmonics at ca. 6.6, 9.9, 13.2 kHz,
962 especially visible in ending syllables.

963 *Measurements.* See Table 7.

964 *Taxonomic discussion.* The specimens observed by Toms (1984) and identified
965 *Xenogryllus eniopteroides* (wrong spelling for *X. eneopteroides*) from Zululand
966 (Mtunzini and Eastern Transvaal (Clanor)), South Africa, belong to *X. mozambicus* n.
967 sp. according to the male specimen observed from the series of Toms (NHMUK
968 010926568).

969

970 ***Xenogryllus transversus* (Walker, 1869)**

971 (Figs 2E-H; 3O-P; 4E; 5G; 7O-P; 8I; 9G; 11M-O; 12D; 17)

972

973 *Platydictylus transversus* Walker, 1869: 88.

974 *Cardiodactylus? transversus* – Saussure 1878: 665.

975 *Madasumma transversa* – Kirby 1906: 94; Chopard 1968: 350.

976 *Xenogryllus transversus* – Chopard 1969: 310; Bhowmik 1976: 46; 1985: 67; Saeed *et*
977 *al.* 1990: 309 (redescription); Yin & Liu 1995: 96; Nattier *et al.* 2011: 2199 (molecular
978 phylogeny); Vicente *et al.* 2017: 2203 (historical biogeography); He 2018: 516; Cigliano
979 *et al.* 2018 (Orthoptera Species File Online).

980 Synonym names:

981 *Dionymus calcaratus* Brunner von Wattenwyl, 1893: 213 – Chopard 1968: 350.

982 *Calyptotrypus roonwali* Bhowmik, 1977: 35 – Vasanth 1993: 131.

983

984 *Type material. Holotype*, ♂, **Bangladesh**: Silhat [= Silhet / Sylhet] (NHMUK010362937)
985 [examined].

986 *Additional examined material. India: Meghalaya*, Jaintia Hills, 1♀, Narpuh R.F.
987 Umpyrsung - off R. Lubha Sunapor Town, N25°06.683' E92°21.559', 149 ft.
988 N25°06.983' E92°21,559', Elev.149ft, 19.x.2004, molecular sample Xtr-X2, Svenson
989 (MNHN-EO-ENSIF87). *India*, 1♀, #6752 (MNHN). **Sikkim**, 1♂, identified *Dionymus*
990 *calcaratus* Br. by L. Chopard (MNHN-EO-ENSIF1516). Lebong, 3000 ft, IX.1908, 1♀,
991 H.M.L., identified *Dionymus calcaratus* Br. (NHMUK010362936). **Manipur**, Imphal
992 Valley, alt 715 m., 11.x.1945, 1♂, HT of *Calyptotrypus roonwali* Bhowmik (ZSI).
993 **Jammu**, Tawi river, 32.715736° 74.860403°, secondary area, 30.VII, 11 pm, 1♂,
994 chorus, molecular sample X26 (MNHN-EOENSIF4395), 1♂ (MNHN). **Punjab**, IISER
995 Mohali, 30.663169° 76.724212°, 6♂ (MJO_765, 766, 411, 715, 413), 2 ♀ (MJO_36,
996 MJO_726), molecular sample Xtr-715, 765, 766, R. Jaiswara (IISER Mohali).
997 **Myanmar**: Bhamo, Birmania, Fea ix.1886, Museo Civ. Genova, 19.176, syntype of
998 *Dionymus calcaratus* (NHMW). **Pakistan**: Mansehra, 34.333882° 73.201062°, 27.ix,
999 1♂, W. A. Panhwar, molecular sample X25 (MNHN-EO-ENSIF4388).

1000 *Type locality.* Bangladesh, Silhet.

1001 *Distribution.* Myanmar, India (North and East), Bangladesh, Pakistan.

1002 *Emended diagnosis.* Species of large size, similar in size, venation and coloration to *X.*
1003 *maichauensis*, from which it differs by male genitalia, with long sclerotized
1004 pseudepiphallic lophi ended by a sharp apex with a dorsal preapical pointed expansion
1005 (Fig. 8I); from *X. ululiu*, *X. transversus* differs by its larger size and by larger
1006 pseudepiphallic sclerite in male genitalia, with lophi proportionally smaller, separated
1007 by a deep indentation (lophi basally fused in *X. ululiu*).

1008 *Redescription.* In addition to the characters of the genus, *X. transversus* has a large
1009 size and a golden coloration (Fig. 2E-H). Fastigium 1.5 times wider than scape, slightly
1010 widened apically as in *X. ululiu* and *X. maichauensis*. Eyes rather small, located on
1011 face, restricted to the dorsal third of head in lateral view (Fig. 3O-P). Lateral angle of
1012 dorsal disc of pronotum not carinated, as in *X. maichauensis* and *X. ululiu*, with a thin
1013 yellow band underlined by a black line anteriorly. Hind wings tail gray brown, nearly as
1014 long as long as pronotum.

1015 *Male.* Pronotum dorsal disc forming a wide trapezoid, with a wide median black
1016 longitudinal band pronlonging vertex coloration; posterior margin slightly bisinuate. FW
1017 venation (Fig. 5G): 1A forming a 90° angle, with 265 stridulatory teeth (n=1) on
1018 transverse part of 1A. Dark coloration anterior to 1A including angle of file. Harp wide.
1019 Mirror large, well-rounded, its inner limit forming a wide curve. Apical field forming a
1020 triangle longer than wide, with six cell alignments.

1021 *Male genitalia* (Fig. 7O-P). Pseudepiphallic sclerite elongate, with a wide basis; lophi
1022 separated by a large indentation (Fig. 8I), similar to that of *X. ululiu*, with a sharp apex
1023 and a strong dorsal preapical expansion. Rami strong, convergent apically. Ectophallic
1024 apodemes strong, lamellate apically. Ectophallic fold and endophallic sclerite almost
1025 fused, forming a long ventral gutter, wider than in *X. ululiu*, trifurcate posteriorly.
1026 Endophallic apodemes made of lateral lamellas.

1027 *Female* (Fig. 2G-H). Head slightly wider than pronotum. Dorsal disc of pronotum almost
1028 rectangular, its posterior margin slightly bisinuate. FWs slightly longer than abdomen,

1029 light brown, with anterior dark spot very small; dorsal field with 10-11 (n = 3) strong
1030 longitudinal veins. Subgenital plate with a deep V-shaped apical indentation with sharp
1031 edges (Fig. 9G). Ovipositor as long as FIII.

1032 *Female genitalia.* Copulatory papilla conical (Fig. 11M-O), wider than in *X.*
1033 *maichauensis*, its apex rounded and sclerotized.

1034 *Life history traits.* *X. transversus* lives in open secondary habitats, where males usually
1035 call in chorus from 120-180 cm height dense shrubs. In IISER Mohali (Northern India),
1036 two males were seen calling from a bamboo plantation on one occasion, from a height
1037 of 60 cm, where one male was probably trying to mount the other (RJ personal obs.). In
1038 Jammu (Northern India), males were found calling from cannabis plant. Calling activity
1039 starts late in the evening, almost around 22:00 hrs and continues until 03:00 hrs in the
1040 morning. Spacing between calling males of this species is quite variable, the closest
1041 males being spaced by approximately one meter horizontally.

1042 *Calling song.* (Figs 12D, 17). The calling songs of three males were recorded from
1043 IISER Mohali campus. At 25-27 °C, the calling song of *X. transversus* is made of short
1044 echemes quickly repeated and lasting for 197 ± 4 ms (echeme period = 873 ± 13 ms),
1045 and composed of 4-5 long syllables ($m = 4.5 \pm 0.5$). Within echemes, the syllables
1046 usually show increasing amplitudes. Syllables are rather long (duration = 31 ± 4 ms)
1047 with a syllable period of 46 ± 3 ms (syllable duty cycle = 71%). The frequency spectrum
1048 shows a pure-tone dominant frequency at 4.5 ± 0.5 kHz followed by two powerful
1049 harmonics.

1050 *Measurements.* See Table 8.

1051 *Taxonomic discussion.* We confirm the status of junior synonyms of *Calypotrypus*
1052 *roonwali* and *Dionymus calcaratus* according to re-examination of type specimens (HT
1053 of *C. roonwali* and one male ST of *D. calcaratus*).

1054

1055 ***Xenogryllus ululiu* Gorochov, 1990**

1056 (Figs 2I-L; 3M-N; 4G; 5H; 7Q-R; 8H; 9E; 11K-L; 12E; 18)

1057

1058 *Xenogryllus ululiu* Gorochov, 1990: 14 – Gorochov 1992: 10; Kim & Pham 2014: 60;
1059 Robillard *et al.* 2007: 1267 (song frequency); Cigliano *et al.* 2018 (Orthoptera Species
1060 File Online).

1061 *Type material. Holotype*, ♂, **Vietnam: Gia Lai**, Kannack, A.V. Gorochov (ZIN) [not
1062 examined]. *Paratype* (1♂), **Vietnam: Gia Lai**, Kannack, A.V. Gorochov: 8-16.ii.1988,
1063 1♂ (MNHN-EO-ENSIF2809) [examined].

1064 *Additional material examined. Vietnam: Gia Lai*, 2.ii.1993, 1♀, identified *Xenogryllus*
1065 *ululiu* by A.V. Gorochov, molecular sample XuIV (MNHN-EO-ENSIF2810); 7.XI.1993,
1066 1♂, molecular sample XuIV2, A.V. Gorochov. **Thailand: Petchabun**, Nam Nao, 16° 47'
1067 N, 101° 27' O, 1000 m, S. Ingrisch; 13.ix.1989-14.ix.1989, S. Ingrisch, 1♂, Stridulation
1068 recorded by S. Ingrisch 0291XENO.WAV, mixed Oak-Pine forest, grassy undergrowth,
1069 Bamboo thicket [day collecting and night collecting following stridulation], identified
1070 *Xenogryllus ululiu* by S. Ingrish, molecular sample XuITh (ZFMK). **Loei**, NamNao NP at
1071 night, 13(14.ix.1989, S. Ingrisch, 1♂, identified *Xenogryllus ululiu* by S. Ingrish,
1072 molecular sample XuITh (ZFMK). **Cambodia: Kampong Spoe**, northern part of Elefan
1073 mts [Dâmrei Mountains], Kiri-Rom National Park, 130 km NNE Sihanoukville, 300-
1074 500m, 27.ix-1.x.2003, A. Gorochov, M. Berezin, 1♂, molecular sample X21-XulCam2,
1075 1♀ (ZIN). **Kaoh Kong**, central part of Elefan mountains [Dâmrei Mountains], vill.
1076 Styeng-Chkhral (100 km NE of Sihanoukville), 300-500m, 27.viii-6.ix.2003, A.
1077 Gorochov, L. Anisyutkin, 1♂, molecular sample X20-XulCam1 (MNHN-EO-
1078 ENSIF4385), 1♂ (ZIN). **Campot**, environs of Sihanoukville (=Kampong Som), 14-
1079 21.ii.1998, A.V. Gorochov, 1♀ (ZIN). Sihanoukville, citi near Siam bay, environs, 22-
1080 26.VIII.2003, A. Gorochov, L. Anisyutkin, 1♂, molecular sample X19-XulSi (ZIN).

1081 **China: Guangdong**, Shenzhen District, Wutongshan Mt., 21.ix.2014, coll. Zhang Tao,
1082 5♂, 3♀, (SNU).

1083 *Type locality*. Vietnam, Gia Lai, Kannack.

1084 *Distribution* (Fig. 16). Vietnam, Thailand, Cambodia, Southern China.

1085 *Emended diagnosis*. Species average to large size, close to *X. transversus* and *X.*
1086 *maichauensis* in terms of shape and coloration, from which it differs by smaller size,
1087 mirror slightly wider than long (less rounded than in *X. transversus* and *X.*
1088 *maichauensis*), and male genitalia looking like a stockier version of that of *X.*
1089 *transversus*, with pseudepiphallid lophi basally fused together (Fig. 8H), with a sharp
1090 posterior apex and a strong dorsal hook-like expansion. In females, head larger than in
1091 other species, wider in dorsal view than rest of body.

1092 *Redescription*. In addition to the characters of the genus, *X. ululiu* has an average size
1093 and a light brown or golden brown coloration (Fig. 2I-L). Head (Fig. 3M-N): Fastigium
1094 slightly widened apically, as in *X. transversus* and *X. maichauensis* (Fig. 4G); eyes
1095 rather small, restricted to the dorsal third of head in lateral view (Fig. 3N). Pronotum
1096 dorsal disc with a wide median black longitudinal band, its lateral angles not carinated,
1097 with a thin yellow band underlined by a black line ventrally. Hind wings tail gray brown,
1098 near twice as long a pronotum.

1099 *Male*. FW venation (Fig. 5H): 1A forming a straight angle. Dark coloration anterior to 1A
1100 not including angle of file. Harp wide, with one short incomplete oblique vein and two
1101 complete ones slightly bisinuate. Mirror large, slightly wider than long, less rounded
1102 than in *X. maichauensis* and *X. transversus*, its inner margin curved as in these
1103 species. Apical field forming a triangle longer than wide, with 6-7 (n = 5) cell
1104 alignments.

1105 *Male genitalia* (Fig. 7Q-R). Pseudepiphallid lophi stocky, basally fused together, with a
1106 sharp apex and a strong dorsal preapical expansion (Fig. 8H). Rami strong, convergent

1107 apically. Ectophallic apodemes strong, lamellate apically. Ectophallic fold and
1108 endophallic sclerite almost fused, forming a long ventral gutter, trifurcate posteriorly
1109 and extended anteriorly between rami. Endophallic apodemes made of anterior lateral
1110 lamellas.

1111 *Female*. Head larger than in male (Fig. 2K-L), wider than rest of body in dorsal view.
1112 Dorsal disc of pronotum almost rectangular, its posterior margin slightly bisinuate. FWs
1113 light brown, anterior dark spot small. Dorsal field with nine strong longitudinal veins.
1114 Subgenital plate with a wide, apical U-shaped indentation with sharp edges (Fig. 9E).
1115 Ovipositor as long as FIII.

1116 *Female genitalia*. Copulatory papilla small, conical, its apex rounded and sclerotized
1117 (Fig. 11K-L).

1118 *Life history traits*. According to S. Ingrish who recorded the species' call in Thailand,
1119 males of *X. ululiu* sing at night in grassy undergrowth of mixed Oak-Pine forest or
1120 bamboo thicket (Cigliano *et al.* 2018).

1121 *Calling song* (Figs 12E, 18). One male from Thailand was recorded by S. Ingrish at
1122 21°C. The song consists of echemes during 566 ± 57 ms, with a period of 2041 ± 358
1123 ms. Echemes are made of 4 or 5 syllables ($m=5$), with syllable duration = 108 ± 3.8 ms
1124 and syllable period = 120.3 ± 3 ms. Within echemes, the three starting syllables have a
1125 lower amplitude than the final 1-2 syllables. Dominant frequency is 4.8 ± 0.4 kHz and
1126 corresponds to the fundamental frequency of the spectrum.

1127 *Measurements*. See Table 9.

1128

1129 **Discussion**

1130 The taxonomic revision of *Xenogryllus* is based on the thorough study of
1131 specimens from natural history collections belonging to 17 institutions and on field work
1132 in Mozambique, China and India. Our study reveals that the genus is relatively little

1133 diversified compared to genera of other tribes of the subfamily Eneopterinae. The
1134 revision clarifies the status of all previously described species and subspecies (Table
1135 1), and added three new species from Africa.

1136 The large geographical coverage of the available data for *Xenogryllus* suggest
1137 that the most common species of the genus are now clearly defined, formally described
1138 or redescribed and included in identification keys. However two of the three new
1139 species described here are based on few specimens only (six males from three
1140 localities in Congo for *X. maniema* n. sp. and a unique male from Guinea for *X. lamottei*
1141 n. sp.). As a consequence, while some species of *Xenogryllus* have wider distributions
1142 across Asia and Africa, where they occur mostly in savannahs and in open shrubby
1143 areas, other species may have more limited distributions, perhaps in association with
1144 more constrained and limited forested habitats. This would involve an undefined
1145 proportion of endemic taxa yet to discover.

1146

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1178

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1337 **Tables**

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1339 **Table 1.**

1340 List of species and revised status of *Xenogryllus* species based on Robillard (2006)
 1341 and Orthoptera Species File Online (Cigliano *et al.* 2018). Junior synonym names for
 1342 which the status is not updated are not considered in this list but are presented in the
 1343 revision under the senior name.

Taxa	Status
<i>Xenogryllus</i> Bolívar 1890	valid genus (emended diagnosis, redescription)
<i>X. eneopteroides</i> Bolívar, 1890	valid species (redescription, type species)
<i>X. carmichaeli</i> (Chopard, 1928)	<i>nomen dubium</i> (new status)
<i>X. lamottei</i> Robillard n. sp.	new species
<i>X. maichauensis</i> Gorochov, 1992	valid species (redescription)
<i>X. maniema</i> Robillard & Jaiswara n. sp.	new species
<i>X. marmoratus</i> (Haan, 1844)	valid species (redescription, neotype, synonymy of subspecies)
<i>X. mozambicus</i> Robillard n. sp.	new species
<i>X. transversus</i> (Walker, 1869)	valid species (redescription)
<i>X. ululiu</i> Gorochov, 1990	valid species (redescription)

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Table 2. Measurements of *Xenogryllus eneopteroides*

	BL	PronL	PronW	FWL	FWW	HWT	FIIL	FIIW	
Males (n=6)	20-27.1	3.4 -3.9	6.1-7	21.5-24.2	8-8.3	7.4-8.3	20.0-22.4	3.1-3.6	
(Male mean)	(22.7)	(3.6)	(6.7)	(23.0)	(8.2)	(7.8)	(21.1)	(3.4)	
Females (n=5)	16.9-22.2	3.8-4.1	5.8-6.0	20.0-20.9	4.9-5.3	7.3-8.4	22.1-22.6	2.2-3.6	
(Female mean)	(19.4)	(4)	(5.9)	(20.5)	(5.1)	(7.9)	(22.4)	(3)	
	TIIL	TIIIs				TallIs			OL
		las	lbs	Oas	Obs	Ids	Ods	OIs	
Males (n=6)	20.0-21.5	9-13	9-11	18-21	8-13	0	6-7	3-6	-
(Male mean)	(20.2)	(10.5)	(9.8)	(19.3)	(10.8)	0	(6)	(5)	-
Females (n=5)	21.6-25.5	9-10	10-13	18-20	13-14	0	6-7	3-6)	8-9
(Female mean)	(23.6)	(9.5)	(11.5)	(19.0)	(13.5)	0	(6)	(5)	(8.42)

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Table 3. Measurements of *Xenogryllus lamottei* n. sp.

	BL	PronL	PronW	FWL	FWW	HWT	FIIL	FIIW	
Holotype male	24.2	3.1	4.6	20	6.6	5.7	19.5	3.3	
	TIIL	TIIIs				TallIs			OL
		las	lbs	Oas	Obs	Ids	Ods	OIs	
Holotype male	?	?	?	?	?	?	?	?	-

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Table 4. Measurements of *Xenogryllus maichauensis*

	BL	PronL	PronW	FWL	FWW	HWT	FIIL	FIIW	
Thailand									
Male	33.3	3.8	5.7	24	8.2	8.4	22.9	4.1	
Female	23.7	3.7	5	24.6	5.5	9.4	22.5	4.2	
China									
Males (n=5)	30.6-32.8	3.3-3.9	4.8-5.1	21.3-24	7.7-8.1	4-5.8	21-22	3.5-4.6	
(Male mean)	(31.4)	(3.7)	(5)	(22.7)	(7.8)	(5.2)	(21.6)	(3.9)	
Females (n=2)	24-27.4	3.4-3.9	4.8-5.3	15.5-18	4.4-5.5	5-8.5	22.1-22	3.7-5.5	
(Females mean)	(25.7)	(3.6)	(5)	(18.5)	(5.1)	(6.2)	(22)	(4.9)	
	TIIL	TIIIs				TallIs			OL
		las	lbs	Oas	Obs	Ids	Ods	OIs	
Thailand									
Male	24.4	12	11	19	13	0	3	6	-
Female	23	10	12	20	17	0	4	4	20.7
China									
Males (n=5)	20-21	11-15	10-12	15	12-13	0	3	3	-
(Male mean)	(20.5)	(12.3)	(11)	(15)	(12)	(0)	(3)	(3)	-
Females (n=2)	21-22	8-11	10-12	14-20	14-17	0	4-5	3-4	23.6-24.2
(Females mean)	(21.3)	(9)	(11)	(17)	(16)	(0)	(5)	(4)	(23.9)

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Table 5. Measurements of *Xenogryllus maniema* n. sp.

	BL	PronL	PronW	FWL	FWW	HWT	FIIL	FIIW	
Holotype male	21.8	2.9	4	18.3	6.6	6.4	?	?	
Males (n=5)	19.8-22.9	2.7-3	3.8-4.4	18.5-21.3	6.4-7.6	5.6-6.4	18.3-19.1	3.1-3.2	
(Male mean)	(21.3)	(2.9)	(4.1)	(19.3)	(6.9)	(5.8)	(18.8)	(3.1)	
	TIIL	TIIIs				TallIs			OL
		las	lbs	Oas	Obs	Ids	Ods	OIs	
Holotype male	?	?	?	?	?	?	?	?	-
Males (n=5)	18.3-19.1	7-13	8-15	16-20	11-16	0	5-9	7-10	-
(Male mean)	(18.7)	(10)	(12)	(18)	(14)	(0)	(7)	(8)	-

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Table 6. Measurements of *Xenogryllus marmoratus*

	BL	PronL	PronW	FWL	FWW	HWT	FIIL	FIIW	
Neotype male	19.4	2.9	4.1	15.5	6.7	3.5	15.3	2.8	
Males (n=4)	18.6-22	2.5-3	3.9-4.8	15.5-17	6.4-6.7	3.1-4.3	14.2-15.8	2.6-3.4	
(Male mean)	(20.4)	(2.9)	(4.3)	(16.5)	(6.5)	(3.4)	(15.3)	(3)	
Females (n=5)	18.8-20	2.1-3.1	3.1-4.3	11.5-15	2.8-4	1.2-6.3	11.8-16.3	2.2-3.2	
(Female mean)	(19.1)	(2.7)	(3.7)	(13.4)	(3.3)	(3.4)	(14.4)	(2.7)	
	TIIL	TIIIs				TallIs			OL
		las	lbs	Oas	Obs	Ids	Ods	Ols	
Neotype male	11.1	9	11	14	16	0	4	5	-
Males (n=4)	11.1-15.8	5-12	10-12	11-20	11-16	0-2	3-7	5-7	-
(Male mean)	(14.1)	(9)	(11)	(16)	(5)	(1)	(5)	(5)	-
Females (n=5)	12.1-14.9	4-10	7-12	13-18	9-13	0-2	2-5	5-10	14.1-19
(Female mean)	(13.3)	(8)	(9)	(16)	(11)	(1)	(3)	(7)	(16.6)

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Table 7. Measurements of *Xenogryllus mozambicus* n. sp.

	BL	PronL	PronW	FWL	FWW	HWT	FIIL	FIIW	
Holotype male	25.5	3.3	4.5	20.5	7.3	7.5	21	3.6	
Males (n=5)	22.5-25.5	2.9-3.3	4.3-4.5	21-22	7-7.2	7-7.5	19-20	3.1-3.9	
(Male mean)	(23.8)	(3.2)	(4.4)	(21.2)	(7.2)	(7.3)	(20)	(3.5)	
Female allotype	21.9	2.9	4.4	17.5	3.8	9	20.5	4	
Females (n=4)	21.5-22.1	3-3.3	4.2-4.5	18-21.5	4-7.7	7.5-8.5	19-20	3.5-4	
(Female mean)	(21.8)	(3)	(4.3)	(19.2)	(5.3)	(7.9)	(19.9)	(3.7)	
	TIIL	TIIIs				TallIs			OL
		las	lbs	Oas	Obs	Ids	Ods	Ols	
Holotype male	20	13	10	15	19	1	8	4	-
Males (n=5)	18-20	9-13	9-14	11-16	16-21	1-2	8-10	4-5	-
(Male mean)	(18.2)	(11)	(12)	(14)	(18)	(1)	(9)	(5)	-
Female allotype	20	9	12	14	17	0	7	6	?
Females (n=4)	19-20	9-15	9-12	14-18	13-18	0-2	6-8	4-6	11.5-13.4
(Female mean)	(19.7)	(16)	(10)	(16)	(17)	(1)	(7)	(5)	(12.5)

Table 8. Measurements of *Xenogryllus transversus*

	BL	PronL	PronW	FWL	FWW	HWT	FIIL	FIIW	
Males (n=6)	27.8-34.6	3.4-3.9	6.1-7	21.5-24.2	8-8.3	7.4-8.3	20.0-22.4	3-4	
(Male mean)	(31.4)	(3.6)	(6.7)	(23.0)	(8.2)	(7.8)	(21.1)	(3.7)	
Females (n=2)	28.5-30	3.8-4.1	5.8-6.0	20.0-20.9	4.9-5.3	7.3-8.4	22.1-22.6	4.2-4.8	
(Female mean)	(29.3)	(4)	(5.9)	(20.5)	(5.1)	(7.9)	(22.4)	(4.5)	
	TIIL	TIIIs				TallIs			OL
		las	lbs	Oas	Obs	Ids	Ods	Ols	
Males (n=6)	20.0-21.5	9-13	9-11	18-21	8-13	0	2-5	2-3	-
(Male mean)	(20.2)	(10.5)	(9.8)	(19.3)	(10.8)	(0)	(3)	(3)	-
Females (n=2)	21.6-25.5	9-10	10-13	18-20	13-14	0	2-3	4-5	25.8-27
(Female mean)	(23.6)	(9.5)	(11.5)	(19.0)	(13.5)	(0)	(3)	(5)	(26.4)

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Table 9. Measurements of *Xenogryllus ululiu*

	BL	PronL	PronW	FWL	FWW	HWT	FIIL	FIIW	
Male paratype	28.2	3.5	4.3	22.2	7.9	7.1	22	3.6	
Males (n=5)	23.3-28.2	3.3-3.5	4.2-4.8	20-22.2	7.1-8.1	3.3-7.9	19-22.7	3.3-4	
(Male mean)	(26)	(3.4)	(4.5)	(21.5)	(7.7)	(5.8)	(21.3)	(3.7)	
Females (n=3)	23.7-25.9	3.4-4	4.5-5	17.2-23.1	3.3-4	5.1-8.2	20-21.5	3.4-4.3	
(Female mean)	(24.5)	(3.7)	(4.8)	(20.2)	(3.8)	(6.9)	(20.5)	(3.8)	
	TIIL	TIIIs				TallIs			OL
		las	lbs	Oas	Obs	Ids	Ods	Ols	
Male paratype	21.8	12	10	20	14	1	4	6	-
Males (n=5)	19.9-21.8	11-12	10-11	16-20	14-16	0-1	4-7	5-8	-
(Male mean)	(20.8)	(11)	(10)	(18)	(15)	(0)	(5)	(6)	-
Females (n=3)	19.8-20.7	7-10	10-11	12-16	14-16	0	3-5	5-7	13.9-17.6
(Female mean)	(20.1)	(9)	(11)	(14)	(15)	(0)	(4)	(6)	(17)

1360 **Legends of figures**

1361

1362 **Figure 1.** (A-C) *Xenogryllus eneopteroides*: male in dorsal (A) and lateral (B) views,
1363 female in dorsal view (C); (D-G) *Xenogryllus marmoratus* male in dorsal (D) and
1364 lateral (E) views, female in dorsal (F) and lateral (G) views; (H-I) *Xenogryllus*
1365 *lamottei* n. sp.: male holotype in dorsal (H) and lateral (I) views; (J-K)
1366 *Xenogryllus maniema* n. sp.: male paratype in dorsal (J) and lateral (K) views;
1367 (L-O) *Xenogryllus maichauensis*: male in dorsal (L) and lateral (M) views,
1368 female in dorsal (N) and lateral (O) views. Scale bar: 1 cm.

1369 **Figure 2.** (A-D) *Xenogryllus mozambicus* n. sp.: male in dorsal (A) and lateral (B)
1370 views, female in dorsal (C) and lateral (D) views; (E-H) *Xenogryllus transversus*:
1371 male in dorsal (E) and lateral (F) views, female in dorsal (G) and lateral (H)
1372 views; (I-L) *Xenogryllus ululiu*: male in dorsal (I) and lateral (J) views, female in
1373 dorsal (K) and lateral (L) views. Scale bar: 1 cm.

1374 **Figure 3.** Heads of *Xenogryllus* in facial (left panel) and lateral views (right panel): (A-
1375 B) *Xenogryllus eneopteroides*; (C-D) *Xenogryllus lamottei* n. sp.; (E-F)
1376 *Xenogryllus maichauensis*; (G-H) *Xenogryllus maniema* n. sp.; (I-J) *Xenogryllus*
1377 *marmoratus*. (K-L); *Xenogryllus mozambicus* n. sp.; (M-N) *Xenogryllus ululiu*;
1378 (O-P) *Xenogryllus transversus*. Scale bar: 1 mm.

1379 **Figure 4.** Heads of *Xenogryllus* in dorsal views: (A) *Xenogryllus eneopteroides*; (B)
1380 *Xenogryllus lamottei* n. sp.; (C) *Xenogryllus maichauensis*; (D) *Xenogryllus*
1381 *maniema* n. sp.; (E) *Xenogryllus marmoratus*; (F) *Xenogryllus transversus*; (G)
1382 *Xenogryllus ululiu*; (H) *Xenogryllus mozambicus* n. sp. Scale bar: 1 mm.

1383 **Figure 5.** Male forewing venation in dorsal view: (A) *Xenogryllus eneopteroides*; (B)
1384 *Xenogryllus lamottei* n. sp.; (C) *Xenogryllus maichauensis*; (D) *Xenogryllus*
1385 *maniema* n. sp.; (E) *Xenogryllus marmoratus*; (F) *Xenogryllus mozambicus* n.
1386 sp.; (G) *Xenogryllus transversus*; (H) *Xenogryllus ululiu*. Scale bar: 5 mm.

1387 **Figure 6.** Male metanotal glandular structures in *Xenogryllus eneopteroides*: (A)
1388 glandular pit (drawing by G. Hodebert (MNHN) modified from Robillard &
1389 Desutter-Grandcolas, 2004b), (B-C), SEM view of glandular pores on scutum.
1390 Scale bars: 1 mm (A), 10 μ m (B), 1 μ m (C).

1391 **Figure 7.** Male genitalia: (A-C) *Xenogryllus eneopteroides*, dorsal (A), ventral (B) and
1392 lateral (C) views; (D-E) *Xenogryllus lamottei* n. sp., ventral (D), lateral (E) views;
1393 (F-G) *Xenogryllus maniema* n. sp., ventral (F), lateral (G) views; (H-I)
1394 *Xenogryllus marmoratus*, ventral (H), lateral (I) views; (J-K) *Xenogryllus*

1395 *mozambicus* n. sp., ventral (J), lateral (K) views; (L-N) *Xenogryllus*
1396 *maichauensis*, pseudepiphallid lophi in ventral (L-M) and lateral (N) views, male
1397 from South China (L), male from Thailand (M, N); (O-P) *Xenogryllus*
1398 *transversus*, dorsal (O), ventral (P) views; (Q-R) *Xenogryllus ululiu*,
1399 pseudepiphallid lophi in dorsal (Q) and ventral (R) views. Scale bar: 1 mm.

1400 **Figure 8.** Right pseudepiphallid lophi of male genitalia in dorsal view: (A-B) *Xenogryllus*
1401 *eneopteroides*, male from Central African Republic (A), male from Ivory Coast
1402 (B); (C) *Xenogryllus lamottei* n. sp.; (D) *Xenogryllus maichauensis*; (E)
1403 *Xenogryllus maniema* n. sp.; (F) *Xenogryllus mozambicus* n. sp.; (G)
1404 *Xenogryllus marmoratus*; (H) *Xenogryllus ululiu*; (I) *Xenogryllus transversus*.
1405 Symbols: Preapical hook-like expansion figured in gray or with a black arrow;
1406 dotted parts represent membranous areas; thin lines represent folds and reliefs
1407 in sclerites. Scale bar: 1 mm.

1408 **Figure 9.** Apex of female subgenital plate and base of ovipositor in ventral view: (A)
1409 *Xenogryllus eneopteroides*; (B) *Xenogryllus marmoratus*; (C) *Xenogryllus*
1410 *maichauensis*; (D) *Xenogryllus mozambicus*; (E) *Xenogryllus transversus*; (F)
1411 *Xenogryllus ululiu*. Scale bar: 1 mm.

1412 **Figure 10.** Apex of female ovipositor: (A) *Xenogryllus eneopteroides*; (B) *Xenogryllus*
1413 *maichauensis*. Scale bar: 1 mm.

1414 **Figure 11.** Female copulatory papilla: (A-B) *Xenogryllus eneopteroides*, in ventral (A)
1415 and lateral (B) views; (C-D) *Xenogryllus marmoratus*, in ventral (C) and lateral
1416 (D) views; (E-G) *Xenogryllus maichauensis*, in ventral (E), dorsal (F) and lateral
1417 (G) views; (H-J) *Xenogryllus mozambicus* n. sp., in ventral (H), dorsal (I) and
1418 lateral (J) views; (K-L) *Xenogryllus ululiu*, in ventral (K) and lateral (L) views; (M-
1419 O) *Xenogryllus transversus*, in ventral (M), dorsal (N) and lateral (O) views.
1420 Scale bar: 0.5 mm.

1421 **Figure 12.** Comparison of calling songs, oscillogram of five echemes: (A) *Xenogryllus*
1422 *maichauensis*; (B) *Xenogryllus marmoratus*; (C) *Xenogryllus mozambicus*; (D)
1423 *Xenogryllus transversus*; (E) *Xenogryllus ululiu*. Scale bar: 1 s.

1424 **Figure 13.** Calling song of *Xenogryllus maichauensis*: (A) oscillogram of 5 echemes;
1425 (B) detailed oscillogram (upper panel) and sonogram (lower panel) of 1
1426 echeme; (C) frequency spectrum.

1427 **Figure 14.** Calling song of *Xenogryllus marmoratus*: (A) oscillogram of 5 echemes; (B)
1428 detailed oscillogram (upper panel) and sonogram (lower panel) of 1 echeme;
1429 (C) detailed oscillogram of one syllable; (D) frequency spectrum.

1430 **Figure 15.** (A-D) *Xenogryllus mozambicus* n. sp.: Savannah habitat in Mozambique
1431 (A), male (B) and female (C) in bushy vegetation at night; male (D) predated by
1432 Reduviidae sp.

1433 **Figure 16.** Calling song of *Xenogryllus mozambicus*: (A) oscillogram of 5 echemes; (B)
1434 detailed oscillogram (upper panel), amplitude envelope (middle panel) and
1435 sonogram (lower panel) of 1 echeme; (C) detailed oscillogram (upper panels)
1436 and sonograms (lower panels) of one the two initial syllables (left) and of the
1437 final syllable (right); (D) frequency spectrum.

1438 **Figure 17.** Calling song of *Xenogryllus transversus*: (A) oscillogram of 5 echemes; (B)
1439 detailed oscillogram (upper panel) and sonogram (lower panel) of 1 echeme;
1440 (C) frequency spectrum.

1441 **Figure 18.** Calling song of *Xenogryllus ululiu*: (A) oscillogram of 5 echemes; (B)
1442 detailed oscillogram (upper panel) and sonogram (lower panel) of 1 echeme;
1443 (C) frequency spectrum.

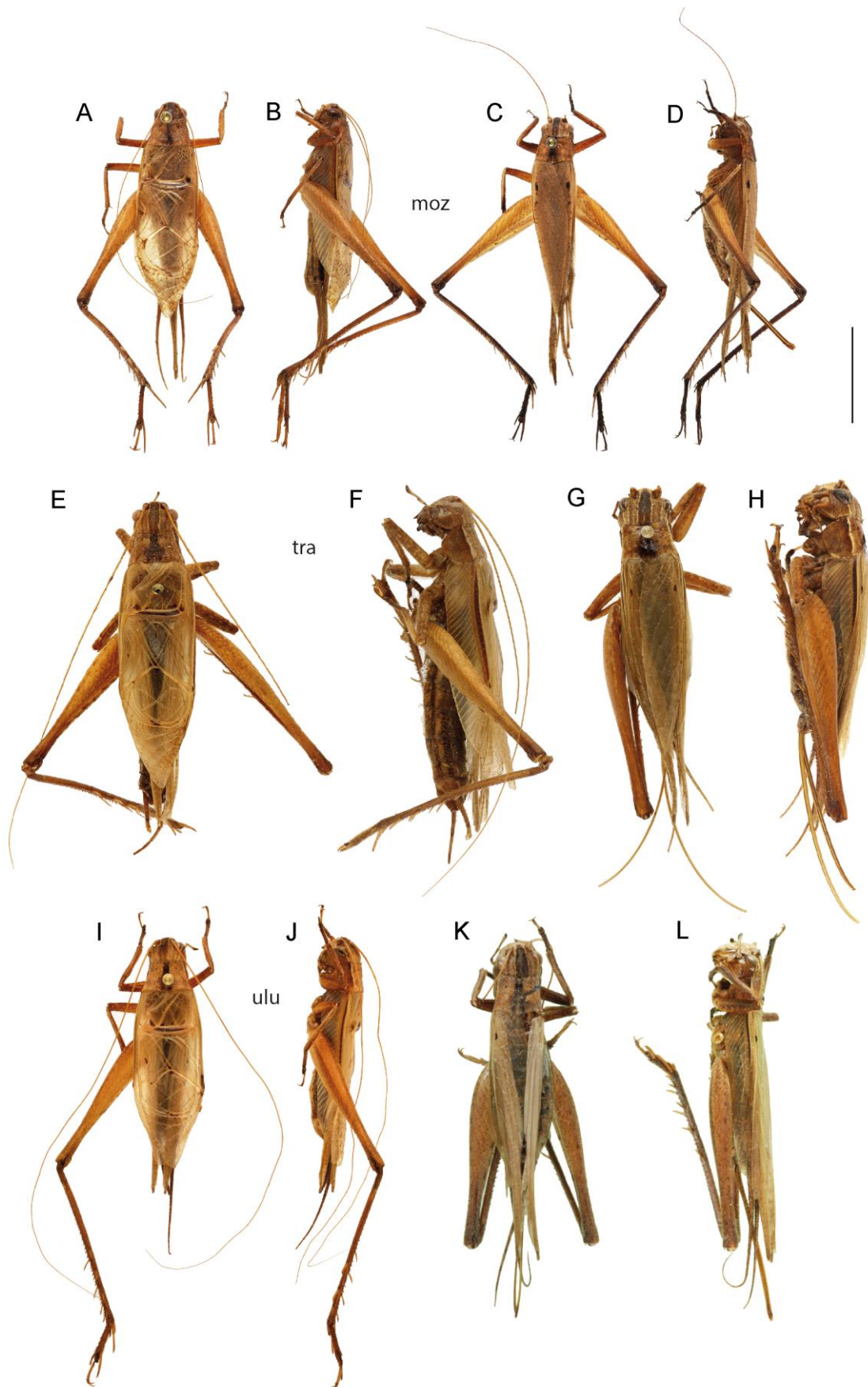
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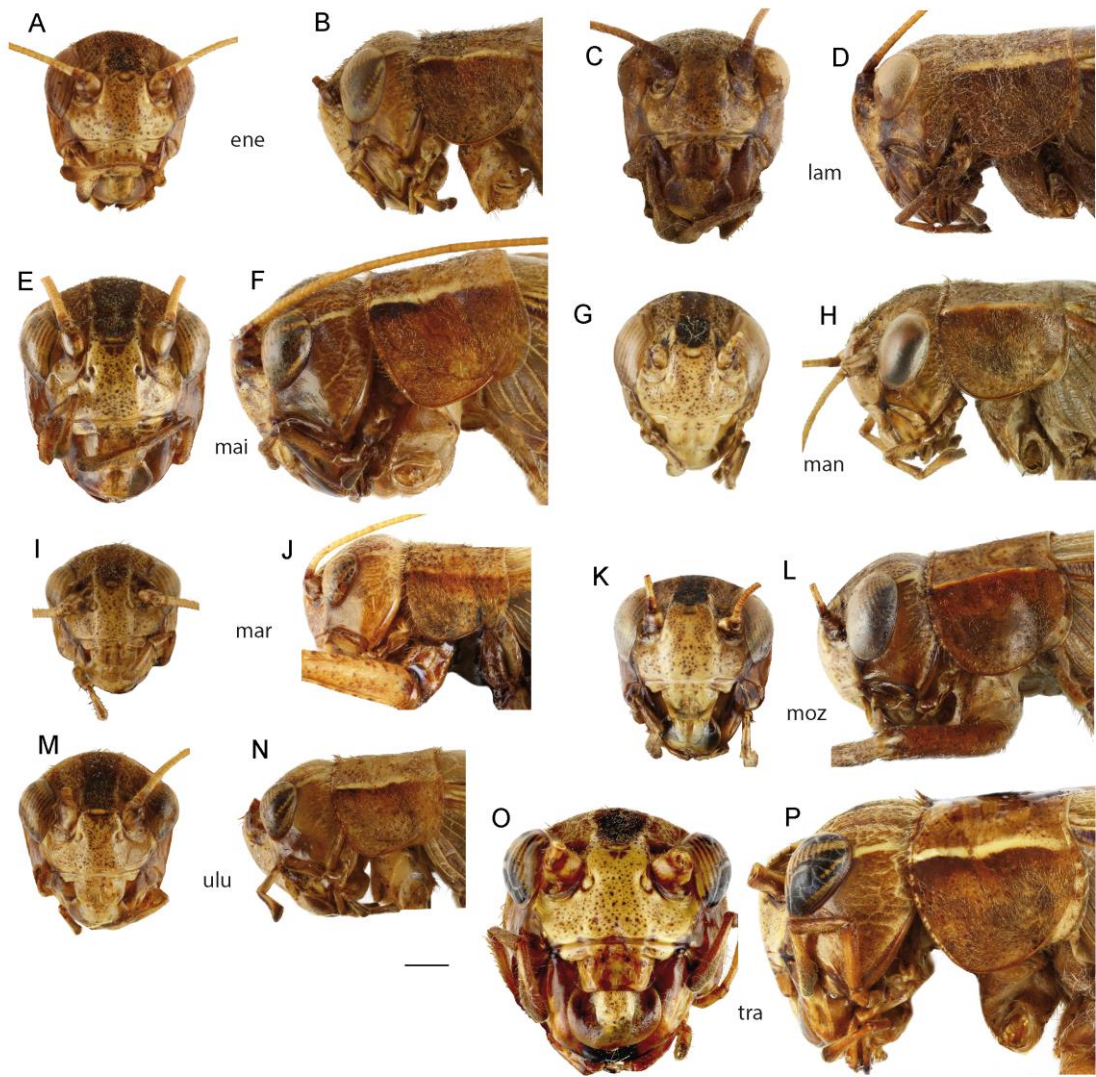
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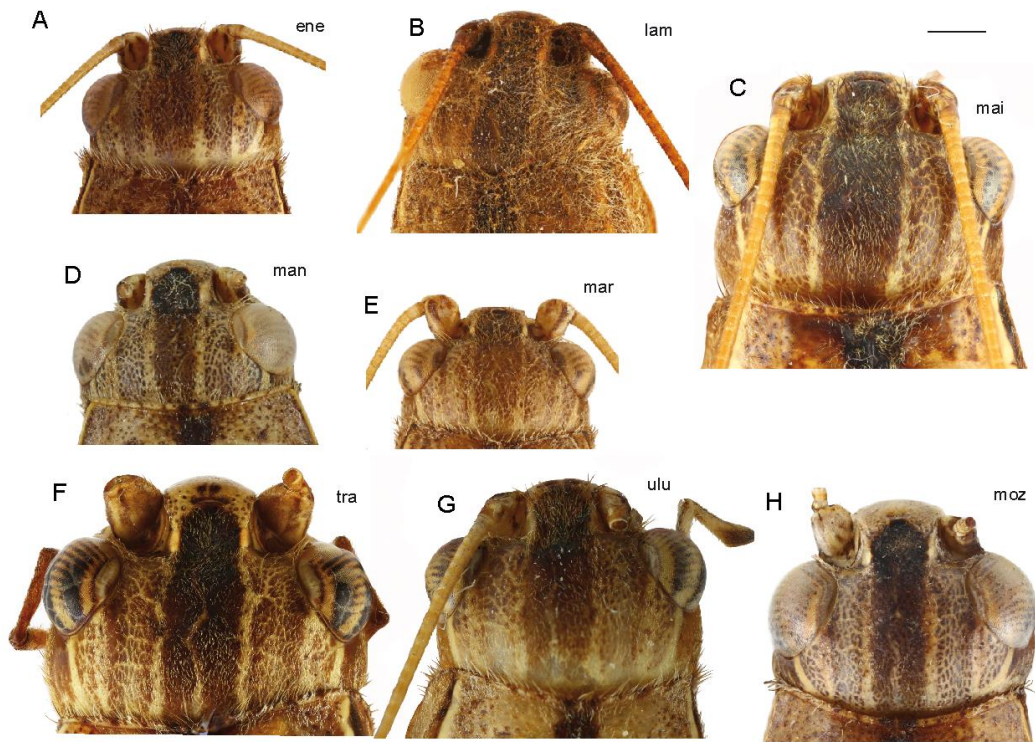
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Fig.3



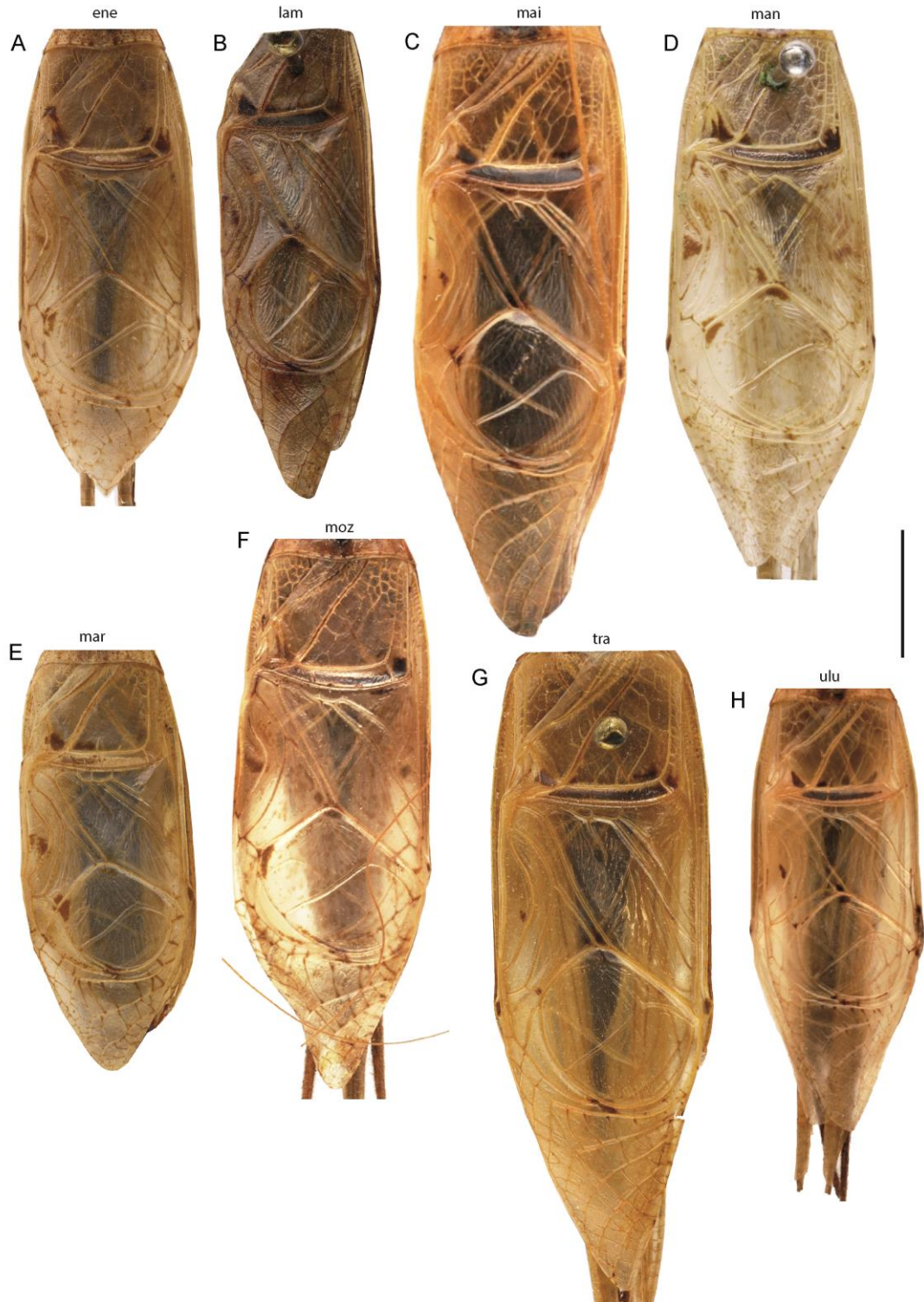
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1454 **Fig. 4**



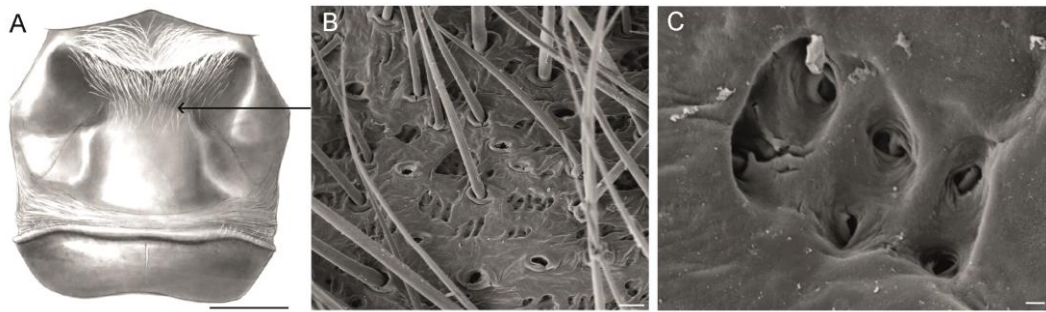
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1457 **Fig. 5**



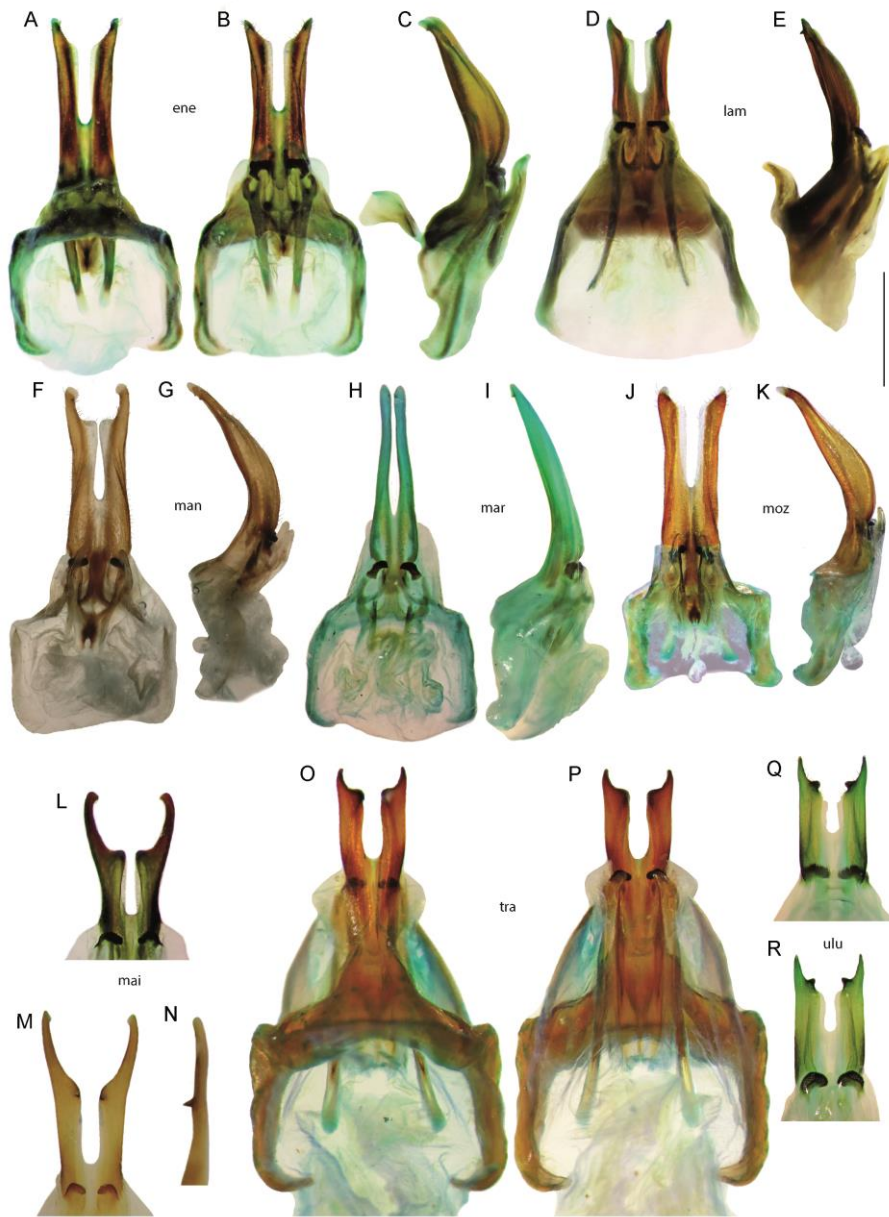
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1460 **Fig. 6**



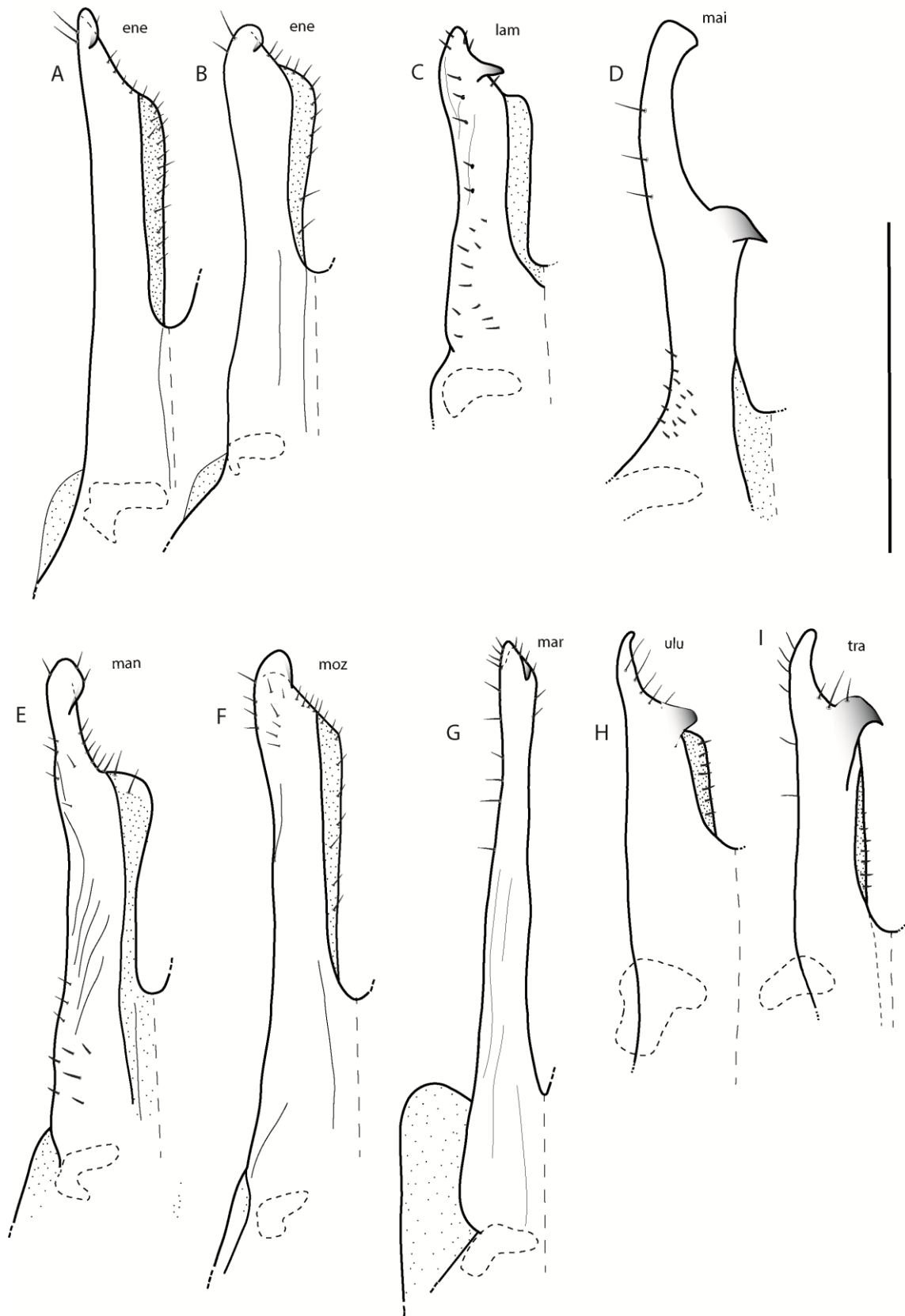
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1463 **Fig. 7**
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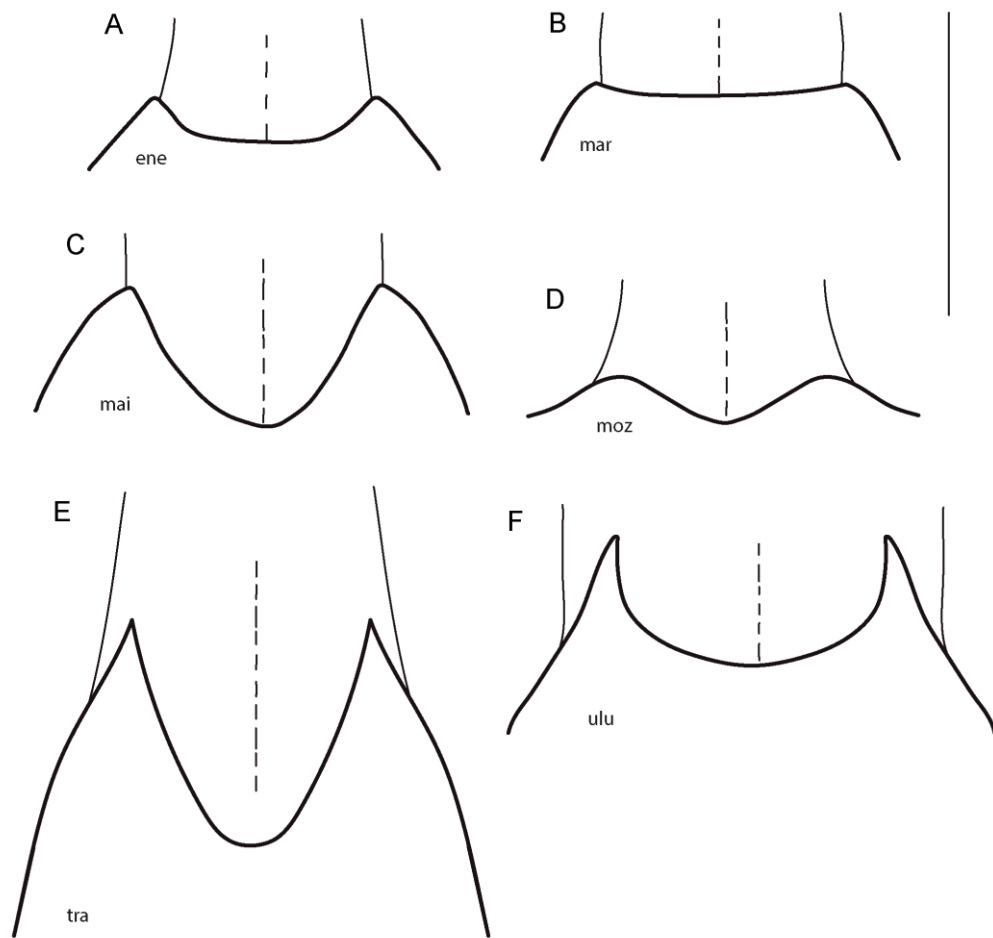
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1467 **Fig. 8**
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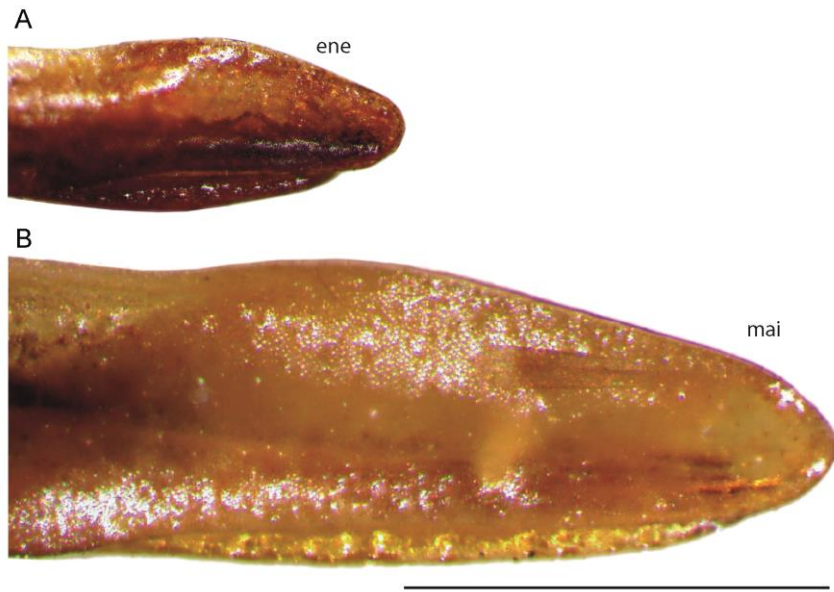
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1472 **Fig.9**
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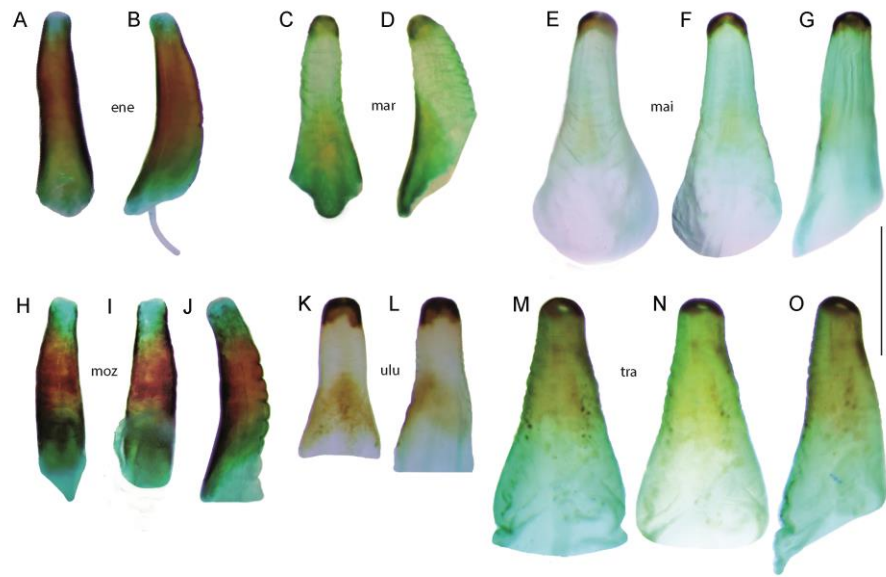
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1477 **Fig. 10**
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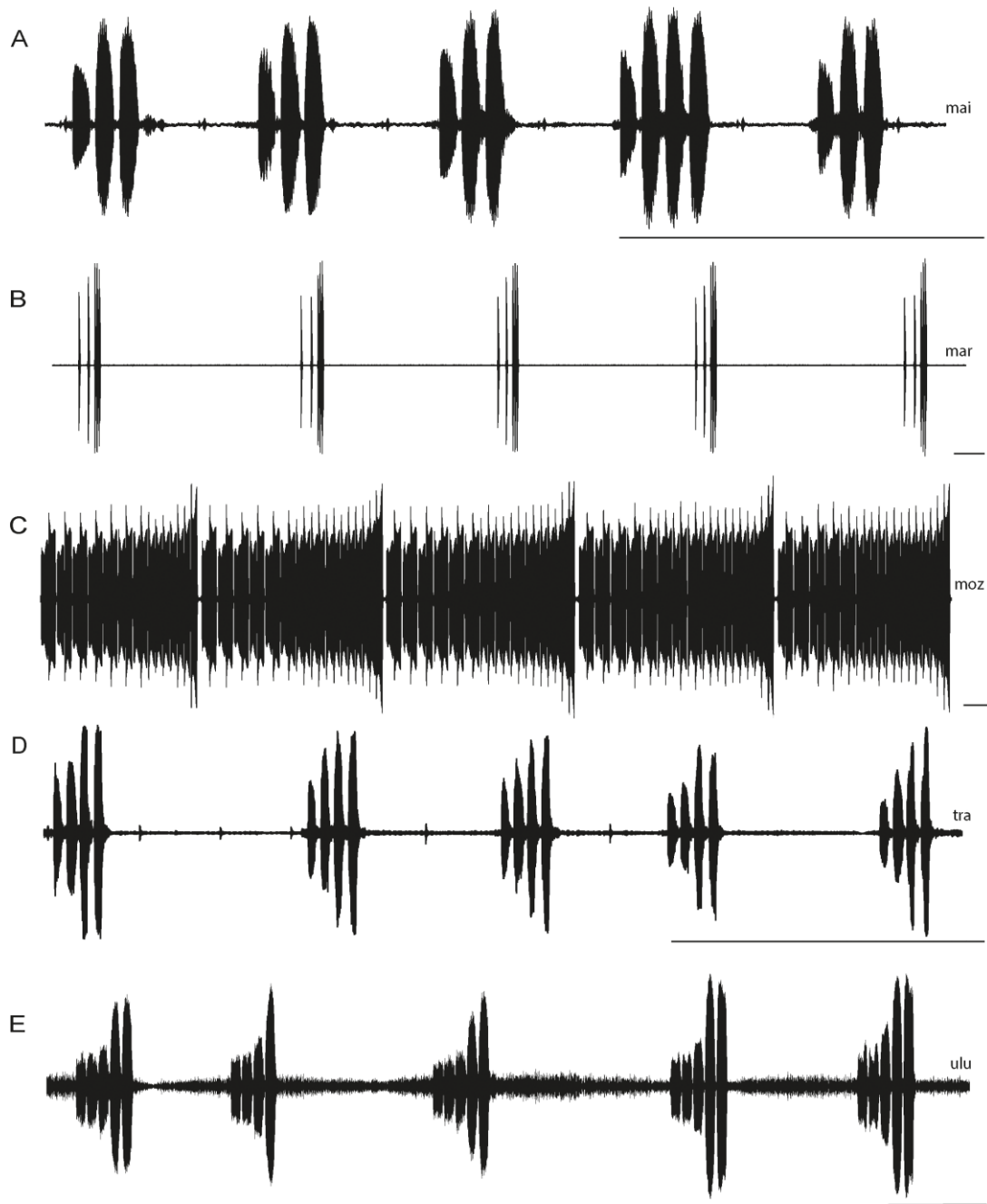
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1481 **Fig. 11**
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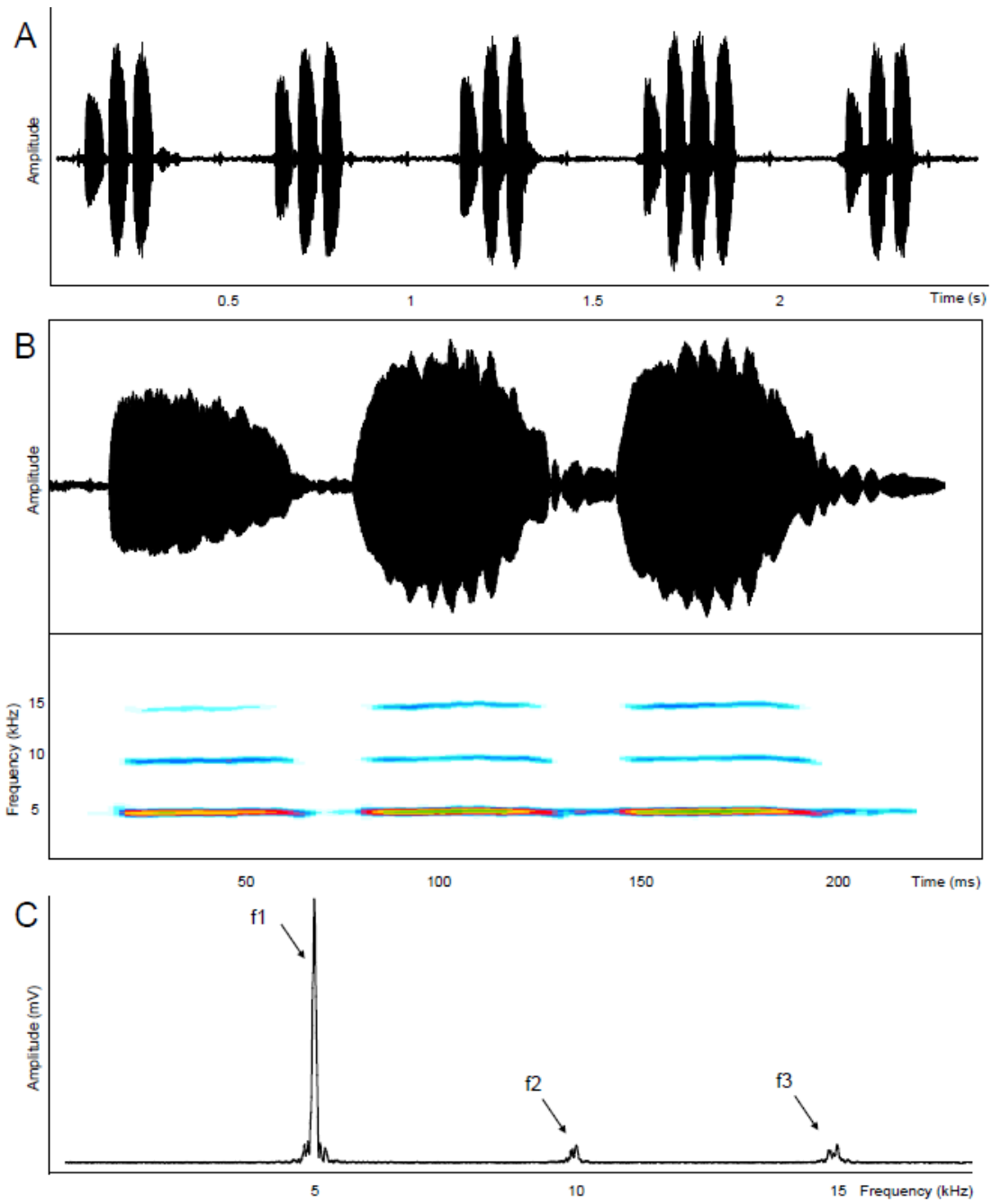
1485 **Fig. 12**
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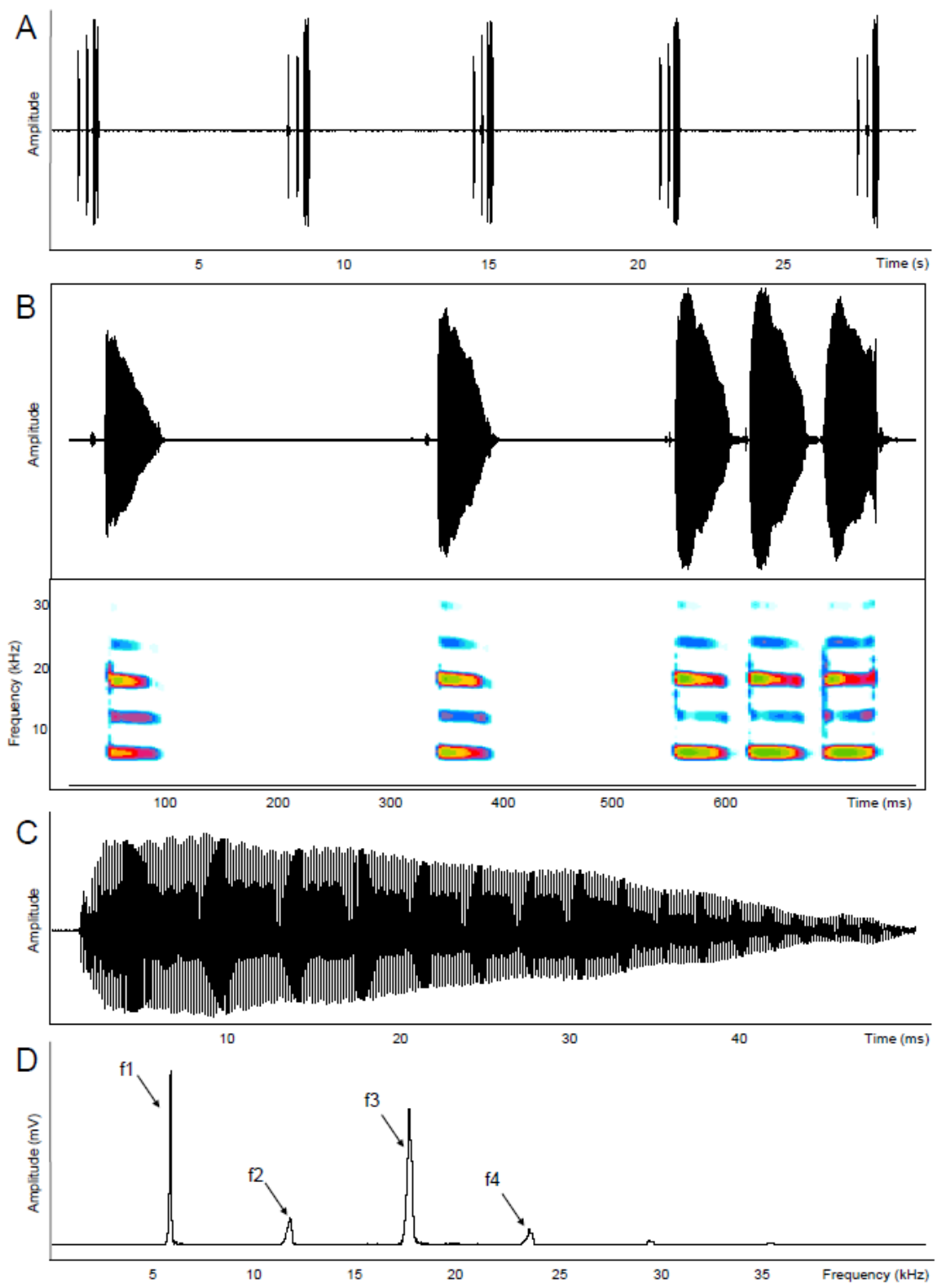
Fig. 13



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Fig. 14



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1495 **Fig. 15**

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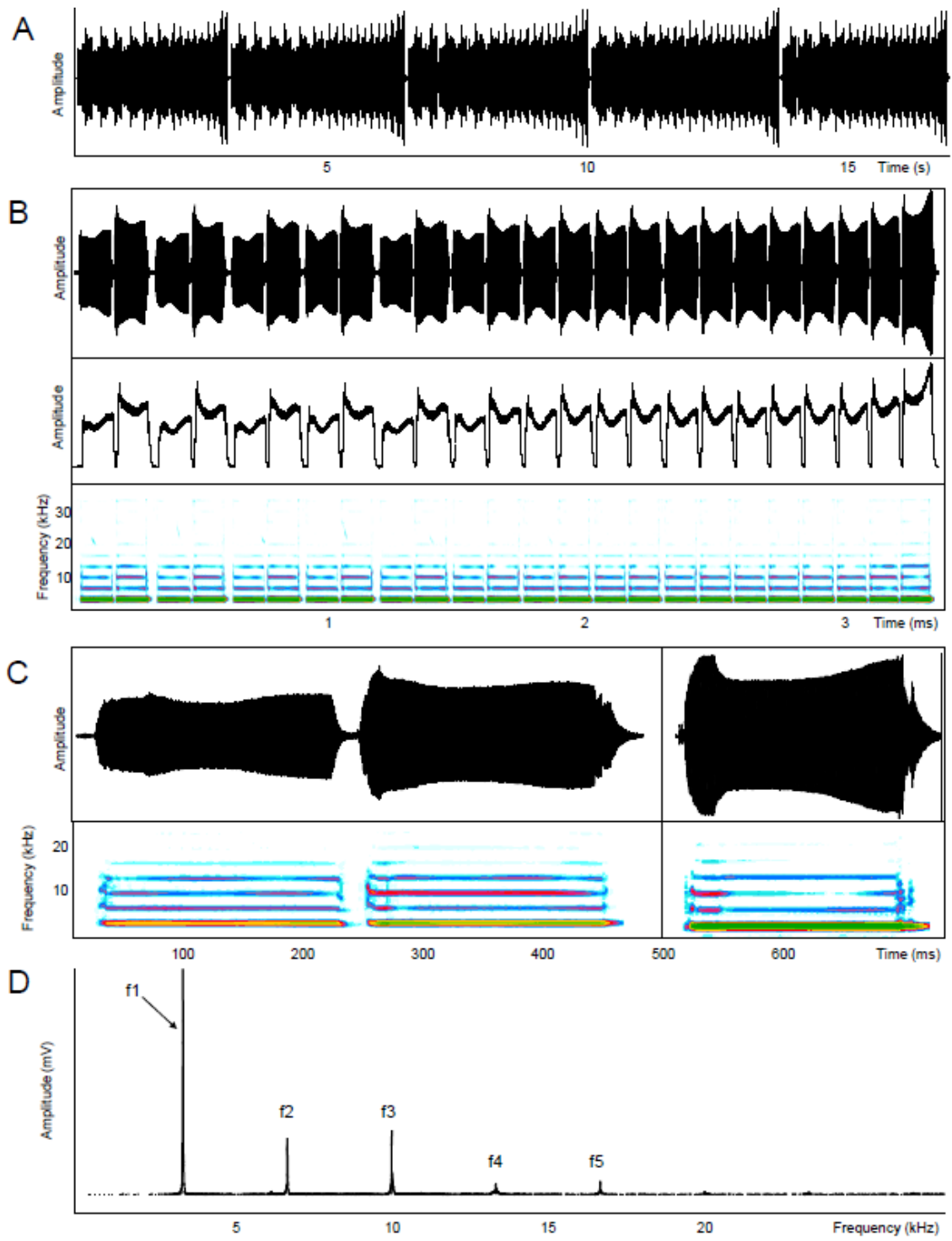


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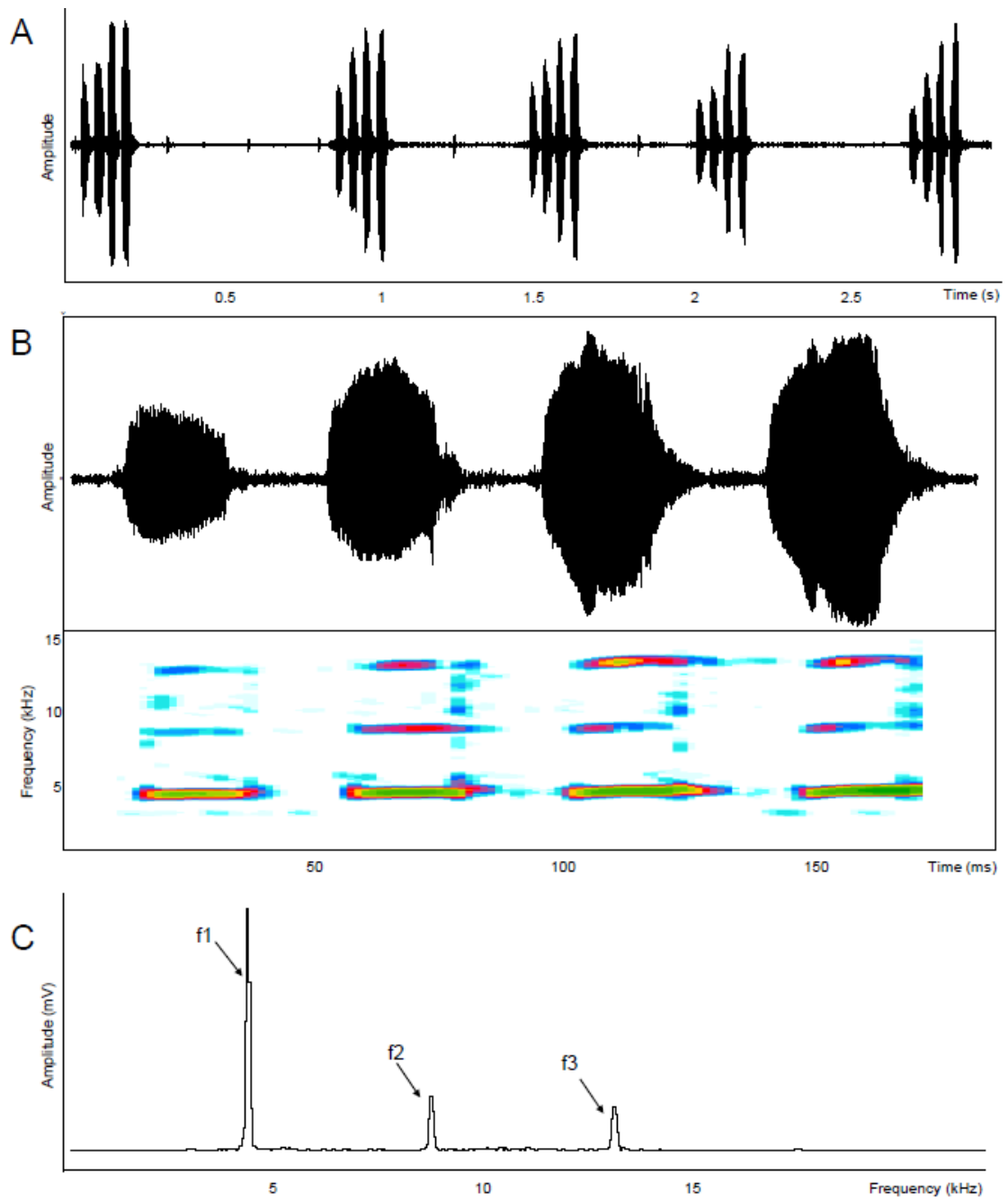
1500 **Fig. 16**



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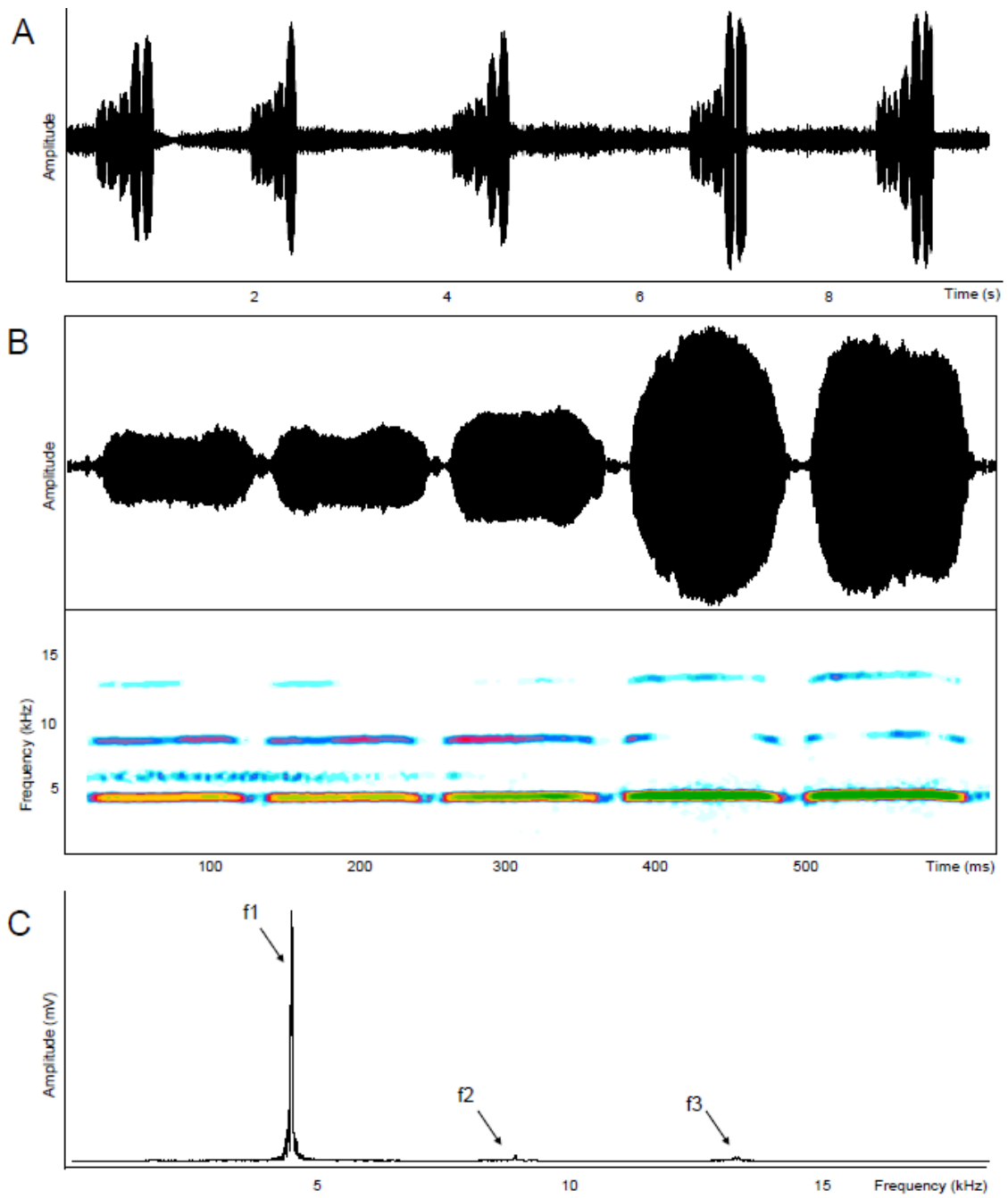
1503 **Fig. 17**



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1506 **Fig. 18**



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