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1 A ‘mid’-Cretaceous piece of **Burmese** amber with a new genus and two new insect species
2 (Odonata: Burmaphlebiidae & ‘Psocoptera’: Compsocidae)

3

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13

14 ABSTRACT

15 *Pouillonphlebia burmitica* gen. et sp. nov. Ngô-Muller, Garrouste and Nel, second genus and
16 species of the ‘mid’-Cretaceous damsel-dragonfly family Burmaphlebiidae, is described from
17 the Burmese amber. This discovery suggests that this family diversified during the early
18 Cretaceous in the ‘Burmese’ island that detached earlier from the Gondwana and was isolated
19 in the Tethys Ocean at that time. We also described from the same piece of amber a small
20 **compsocid psocodean** *Burmacompsocus pouilloni* sp. nov., third species belonging to this
21 genus, only known from the ‘mid’-Cretaceous Burmese amber. This discovery confirms that
22 the Compsocidae were certainly much more diverse during the Cretaceous than nowadays.

23

24 Keywords:

25 Odonata

26 Psocodea
27 Epiproctophora
28 Epiophlebioptera
29 Troctomorpha
30 Myanmar

31

32 **1. Introduction**

33 The ‘mid’-Cretaceous Burmese amber represents a crucial hotspot for insect palaeobiodiversity
34 during the late Mesozoic. It is especially true for the Odonata, with no less than 21 families, 29
35 genera and 35 described species till 2019; and for the Psocodea (Psocoptera) with no less than
36 nine families, 11 genera and 17 described species. The Burmese amber Odonata belong mainly
37 to the suborder Zygoptera, even if few larger Anisoptera are recorded. The so-called
38 ‘Anisozygoptera’, paraphyletic stem group of Anisoptera, are represented by first record of the
39 Stenophlebiidae in amber and the monospecific family Burmaphlebiidae. These last damsel-
40 dragonflies are especially interesting because, if the anisopteran stem group is quite diverse
41 during the Mesozoic, there are very few fossils of this ‘group’ in amber. Here we describe the
42 second representative of the Burmaphlebiidae as a new genus and species, also from the same
43 Burmese amber. This Odonata is fossilized with five beetles (two Staphylinidae, a possible
44 Byrrhoidea and two undetermined species, A. Kirejtshuk, pers. comm.), an undetermined
45 Sciaridae, and a new species of Psocodea that we also describe in this paper (Fig. 1).

46

47 **2. Materials and methods**

48 The fossils are in a small piece of clear Burmese amber, 2.0x1.0x0.5 cm, cut, shaped, and
49 polished. Some are well preserved while others are smashed and unidentifiable. The damsel-
50 dragonfly wings and body segments seem to be embedded across a separation between two

51 layers, nearly perpendicular to it, with resins of different colors and aspect at the limit. This
52 probably indicates that it was caught first by the head and legs and half of the body before being
53 covered by a second resin flow. The abdominal segments of the damselfly and the
54 Byrrhoidea are empty and filled with resin.

55 The specimens were examined with a Nikon SMZ 1500 and a Nikon SMZ25. Photographs were
56 taken with a Nikon D800 digital camera mounted on the stereomicroscopes lenses; photographs
57 were processed using the image editing software Adobe Photoshop CS. Helicon focus software
58 was used for stacking the different photographs. Line drawings of the venation were prepared
59 directly with the aid of a camera lucida and drawn with Inkscape Software. Wing venation
60 terminology for the Odonata follows that of Riek and Kukalová-Peck (1984), and the phylogeny
61 is mainly based on Bechly (1996). For the Psocodea, we follow in part the catalogue of Lienhard
62 and Smithers (2002), and the works of Smithers (1972; 1990) as essential tools for the
63 systematic of the order. We follow the nomenclature of wing venation and body structures of
64 Smithers (1972).

65 The piece of Burmese amber was collected from deposits in the Hukawng Valley (Kachin),
66 North of Myanmar (Dong et al., 2015). The age of amber is given by radiometric analysis of
67 zircons as earliest Cenomanian, *ca.* 99 Ma. (Shi et al. 2012), but it could be a little older (Mao
68 et al., 2018). This manuscript has been registered in ZooBank under the number:
69 urn:lsid:zoobank.org:pub: xxxx

70 Abbreviations. Ax, primary antenodal cross vein; arc, arculus; dc, discoidal cell; sn, subnodus;
71 C, Costa; RA, Radius anterior; RP, Radius posterior; IR, Interradius; Rspl, Radial supplement;
72 M Median vein; MA, Media anterior; MP, Media posterior; Mspl, Median supplement; CuA,
73 Cubitus anterior.

74

75 **3. Systematic paleontology**

76 Order: Odonata Fabricius, 1793

77 Suborder: Epiophlebioptera Bechly, 1996

78 Superfamily: Epiophlebioidea Muttkowski, 1910

79 Family: Burmaphlebiidae Bechly and Poinar, 2013

80 Type genus: *Burmaphlebia* Bechly and Poinar, 2013

81 Other genus. *Pouillonphlebia* gen. nov. Ngô-Muller, Garrouste and Nel

82 **Emended diagnosis.** Very small damsel-dragonfly species characterised by the following set of
83 characters: wing length only about 13mm (autapomorphy); secondary antenodals present in
84 both rows (plesiomorphy); arculus (arc) only slightly distal of Ax1 (autapomorphy); nodus and
85 subnodus (sn) very oblique (autapomorphy); postnodals not aligned with subnodals
86 (plesiomorphy); pterostigma very short (1.5 cells) (autapomorphy), but distinctly braced
87 (plesiomorphy); discoidal cell (dc) basally closed (at least in one of the wing pairs), undivided
88 and with acute distal angle (plesiomorphy); first branching of RP recessed midway between
89 arculus and nodus (plesiomorphy); origin of IR2 below nodus (in *Pouillonphlebia* gen. nov.) or
90 more basal between arculus and subnodus (in *Burmaphlebia*); RP2 originates two cells distal
91 of nodus (autapomorphy); lesterine oblique vein absent (autapomorphy); IR1 long and straight
92 (plesiomorphy); shorter convex intercalary vein between IR1 and RP2; a longer concave and a
93 shorter convex intercalary vein in the distal expanded area between IR2 and RP3/4; cubito-anal
94 field not expanded and with a single row of cells (autapomorphy); wing slender and wing base
95 only briefly stalked.

96

97 Genus *Pouillonphlebia* Ngô-Muller, Garrouste and Nel gen. nov.

98 Type species: *Pouillonphlebia burmitica* Ngô-Muller, Garrouste and Nel sp. nov.

99 *Etymology.* Named in honor of Dr. Jean-Marc Pouillon, who authorized us to study the type
100 specimen, and the Greek word phleps (gen. phlebos) for vein.

101 *Diagnosis.* Base of IR2 slightly basal to nodal brake (**autapomorphy**); three antenodal crossvein
102 of first row and two antenodal crossveins of second row distal of Ax2; base of RP2 less than
103 one cell distal of subnodus; a complete secondary antenodal crossvein between Ax1 and Ax2.

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105

106 ***Pouillonphlebia burmitica*** Ngô-Muller, Garrouste and Nel sp. nov.

107 (Figs 2-3)

108 urn:lsid:zoobank.org:pub: xxxx

109 *Holotype.* MNHN.F.A71319 (1/8) (JMPB001 1/8, Collection Jean-Marc Pouillon), deposited
110 in the Muséum national d'Histoire naturelle, Paris, France.

111 *Locality and horizon.* Burmese amber (Burmite), Lower Cretaceous, lowermost Cenomanian;
112 Noiye Bum 2001 Summit Site, Hukawng Valley, south-west of Maingkhwan in Kachin State
113 (26°20'N, 96°36'E) in Myanmar (Burma).

114 *Etymology.* Named after Burma.

115 *Diagnosis.* As for the genus.

116 *Description.* The fore- and hindwing of a fossil damsel-dragonfly, with missing wing apices.
117 Wings hyaline, maximum width of fore wing 3.6 mm; hindwing slightly broader than fore wing,
118 maximum width 3.8 mm; venations of both wing pairs very similar; distance arculus to nodus
119 3.6 mm (fore wing), 3.8 mm (hindwing); distance from nodus to pterostigma 6.97 mm
120 (hindwing); a very oblique nodal veinlet and oblique subnodus; two primary antenodal
121 crossveins Ax1 and Ax2 with a single well aligned secondary antenodal inbetween, distance
122 between Ax1 and Ax2 1.36 mm (fore wing), 1.27 mm (hindwing); three secondary antenodals
123 between Ax2 and nodus in first row and two in second row; three antesubnodal crossveins
124 between arculus and subnodus; nine postnodals and six postsubnodals in fore wing, six
125 postnodals and five postsubnodals in hindwing, non-aligned; pterostigma not preserved, but

126 strongly braced; discoidal cells basally closed, free (not divided by cross veins), small,
127 quadrangular with acute distal angle, that of hindwing slightly broader than that of fore wing;
128 subdiscoidal cell elongate, narrow and free; arculus angulate and very close to Ax1; sectors of
129 arculus (RP and MA) separated at origin; only a single antefurcal crossvein basal of midfork;
130 midfork (first branching of RP) recessed slightly distal of midway between discoidal cell and
131 nodus, distance between arculus and base of RP3/4 2.38 mm; origin of IR2 one long cell distal
132 of RP3/4 and below subnodus; origin of RP2 one postnodal cell distal of subnodus; lestine
133 oblique vein absent; IR1 long and straight; shorter convex intercalary vein between IR1 and
134 RP2; a longer concave and a shorter convex intercalary vein in distal expanded area between
135 IR2 and RP3/4; cubito-anal field not expanded and with a single row of cells.

136 Two complete segments of abdomen (probably third and fourth) plus distal half of second and
137 a fragment of fifth; small spines on dorsal crest and on intertegmental sutures of segments. No
138 trace of a secondary genital abdominal apparatus on second segment (probably a female).

139 *Discussion.* *Pouillonphlebia* gen. nov. has nearly all the diagnostic characters of the
140 monospecific Burmese amber family *Burmaphlebiidae* as defined in Bechly and Poinar (2013)
141 (see emended diagnosis above). Only the character ‘pterostigma very short (1.5 cells long)’ is
142 unknown in *Pouillonphlebia* gen. nov.

143 Bechly and Poinar (2013) already discussed the position of *Burmaphlebia* and concluded that
144 it can be placed into the Epiproctophora (‘Anisozygoptera’ + Anisoptera), and more precisely
145 in the superfamily Epiophlebioidea. We confirm the hypothesis of these authors about the
146 presence of a basally closed discoidal cell in both wing pairs.

147 *Pouillonphlebia* gen. nov. differs from *Burmaphlebia reifi* Bechly and Poinar, 2013 in the base
148 of IR2 slightly basal to nodal brake, while it is recessed midway between arculus and nodus in
149 the later. **This character of *Pouillonphlebia* gen. nov. is remarkable because the base of IR2 is
150 generally much more basal in the Epiproctophora and especially in the extant Epiophlebiidae.**

151 *Pouillonphlebia* gen. nov. has also three antenodal crossvein of first row distal of Ax2 instead
152 of two in the later; and the base of RP2 is less than one cell distal of subnodus instead of being
153 one postnodal cell in *Burmaphlebia reifi*. The first character is sufficient for a generic separation
154 between *Pouillonphlebia* gen. nov. and *Burmaphlebia*.

155

156 Order: Psocodea Hennig, 1953

157 Suborder: Troctomorpha Roesler, 1944

158 Family: Compsocidae Mockford, 1967

159 Genus *Burmacompsocus* Nel and Waller, 2007

160 Type species. *Burmacompsocus perreai* Nel and Waller, 2007; other species.

161 *Burmacompsocus coniugans* Sroka and Nel, 2017, *Burmacompsocus pouilloni* sp. nov.

162

163 *Burmacompsocus pouilloni* Ngô-Muller, Garrouste and Nel sp. nov.

164 (Fig. 4)

165 urn:lsid:zoobank.org:pub: xxxx

166 *Holotype*. MNHN.F.A71319 (2/8) (JMPB001 2/8, Collection Jean-Marc Pouillon, in the same
167 piece of amber with the damsel-dragonfly, showing three legs of the same side attached to
168 fragments of thorax; fore- and hindwings situated apart), deposited in the Muséum national
169 d'Histoire naturelle, Paris, France.

170 *Locality and horizon*. Burmese amber (Burmite), Lower Cretaceous, lowermost Cenomanian;
171 Noije Bum 2001 Summit Site, Hukawng Valley, south-west of Maingkhwan in Kachin State
172 (26°20'N, 96°36'E) in Myanmar (Burma).

173 *Etymology*. Named in honor of Dr. Jean-Marc Pouillon, who authorized us to study the type
174 specimen.

175 *Diagnosis.* M not fused to RP; a deep area between branches of RP (ratio distance between
176 apices of RP1 and RP2 / distance between apex of RP2 and fork of RP = 2.75); a deep area
177 between M2 and M3 (ratio distance between apices of M2 and M3 / distance between apex of
178 M2 and base of M1+2 = 4.2).

179 *Description.* Fore wing hyaline, glabrous, micro-vestitute of membrane in form of short points,
180 wing 1.74 mm long, 0.64 mm wide; pterostigma closed basally, not sclerotized, 0.32 mm long;
181 areola postica 0.43 mm long, 0.12 mm wide, not joined to M by a crossvein; M not fused to Rs;
182 nodulus present; two anal veins not fused distally.

183 Hindwing hyaline, 1.5 mm long; first segment of Rs absent; vein M two-branched.

184 All tarsi three-segmented, t1 the longest; pretarsal claw with two preapical denticles; pulvillus
185 not visible.

186 *Discussion.* Because of the incompleteness of this fossil, we can only use the leg and wing
187 venation characters to determine its affinities. Nevertheless, according to Smithers' works
188 (1972, 1990) on psocopteran families, *Burmacompsocus pouilloni* sp. nov. falls into the family
189 Compsocidae due to the following diagnostic features: macropterous; tarsi three-segmented;
190 body (preserved parts) and wings without flattened scales; fore wing venation not reduced to
191 two parallel, partially evanescent, longitudinal veins; pterostigmal cell closed basally and not
192 thickened or more opaque than the rest of the membrane; fore wing with a nodulus; fore wing
193 with two anal veins; hindwing with M forked; tarsal claws with one preapical tooth, claws of
194 each pair similar to one another. The absence of the first section of RP in hindwing and the
195 forewing membrane with fine points excludes affinities with the extant genus *Compsocus*
196 Banks, 1930. The fore wing anal veins not joining plus the vein M bifurcating into M1+2 and
197 M3 would let it fall near the Burmese amber genus *Burmacompsocus* Nel and Waller, 2007
198 (Azar et al., 2016). *Burmacompsocus pouilloni* differs from *Burmacompsocus coniugans* in the
199 very long branches of M. *Burmacompsocus pouilloni* is clearly more closely related to

200 *Burmacompsocus perreai*, with which it shares longer branches of M. Nevertheless,
201 *Burmacompsocus pouilloni* differs from the later in the deeper area between the branches of RP
202 (ratio distance between apices of RP1 and RP2 / distance between apex of RP2 and fork of RP
203 = 2.75 in *B. pouilloni* contra 2.1 in *B. perreai*). The area between M2 and M3 is also deeper
204 in *B. pouilloni* than in *B. perreai*, viz. ratio distance between apices of M2 and M3 / distance
205 between apex of M2 and base of M1+2 = 4.2 in *B. pouilloni* contra 2.5 in *B. perreai* (compare
206 Fig. 4 with the photograph of the type of *B. perreai* on internet site
207 <https://mediaphoto.mnhn.fr/media/1548340289885P3qcMA6HT2KMulSm>). Therefore we
208 consider our fossil as a new species of *Burmacompsocus*.

209

210 **4. Conclusion**

211 *Pouillonphlebia* gen. nov. is the second taxon of this family only currently recorded from the
212 Burmese amber. Bechly and Poinar (2013) considered that the Epiophlebioidea are Liassic; thus
213 their presence in the ‘mid’-Cretaceous of Myanmar is not surprising. The small family
214 Burmaphlebiidae possibly appeared and diversified during the **Early** Cretaceous in the Burmese
215 island that was in the ‘middle’ of the Tethys Ocean at that time. *Burmacompsocus pouilloni* sp.
216 nov. is the fourth accurate compsocid species in the Burmese amber, in two extinct genera,
217 while this family comprises only two extant genera and species. It confirms that this family was
218 much more diverse during the Cretaceous than nowadays.

219

220 **Acknowledgements**

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222 the paper.

223

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273

274 **Fig. 1.** MNHN.F.A71319, general view, Byr Byrroidea, Sciar Sciaridae, Staph Staphylinidae,
275 Pso Psocodea. Scale bar represents 2 mm.

276 **Fig. 2.** *Pouillonphlebia burmitica* gen. et sp. nov., holotype MNHN.F.A71319 (1/8). Habitus.
277 Scale bar represents 0.2 mm.

278 **Fig. 3.** *Pouillonphlebia burmitica* gen. et sp. nov., holotype MNHN.F.A71319 (1/8). (A)
279 drawing of forewing; (B) drawing of hindwing. Scale bars represent 1 mm.

280 **Fig. 4.** *Burmacompsocus pouilloni* sp. nov., holotype MNHN.F.A71319 (2/8). (A) two wings
281 with legs and thorax; (B) second hindwing; (C) hind leg. Scale bars represent 0.5 mm (A, B);
282 0.2 mm (C).

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298 ABSTRACT

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316 **1. Introduction**

317 The ‘mid’-Cretaceous Burmese amber represents a crucial hotspot for insect palaeobiodiversity
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324 dragonflies are especially interesting because, if the anisopteran stem group is quite diverse
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329 Sciaridae, and a new species of Psocodea that we also describe in this paper (Fig. 1).

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331 **2. Materials and methods**

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335 layers, nearly perpendicular to it, with resins of different colors and aspect at the limit. This
336 probably indicates that it was caught first by the head and legs and half of the body before being
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339 The specimens were examined with a Nikon SMZ 1500 and a Nikon SMZ25. Photographs were
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343 directly with the aid of a camera lucida and drawn with Inkscape Software. Wing venation
344 terminology for the Odonata follows that of Riek and Kukalová-Peck (1984), and the phylogeny
345 is mainly based on Bechly (1996). For the Psocodea, we follow in part the catalogue of Lienhard
346 and Smithers (2002), and the works of Smithers (1972; 1990) as essential tools for the
347 systematic of the order. We follow the nomenclature of wing venation and body structures of
348 Smithers (1972).

349 The piece of Burmese amber was collected from deposits in the Hukawng Valley (Kachin),
350 North of Myanmar (Dong et al., 2015). The age of amber is given by radiometric analysis of
351 zircons as earliest Cenomanian, *ca.* 99 Ma. (Shi et al. 2012), but it could be a little older (Mao
352 et al., 218). This manuscript has been registered in ZooBank under the number:
353 urn:lsid:zoobank.org:pub: xxxx

354 Abbreviations. Ax, primary antenodal cross vein; arc, arculus; dc, discoidal cell; sn, subnodus;
355 C, Costa; RA, Radius anterior; RP, Radius posterior; IR, Interradius; Rspl, Radial supplement;
356 M Median vein; MA, Media anterior; MP, Media posterior; Mspl, Median supplement; CuA,
357 Cubitus anterior.

358

359 **3. Systematic paleontology**

360 Order: Odonata Fabricius, 1793

361 Suborder: Epiophlebioptera Bechly, 1996

362 Superfamily: Epiophlebioidea Muttkowski, 1910

363 Family: Burmaphlebiidae Bechly and Poinar, 2013

364 Type genus: *Burmaphlebia* Bechly and Poinar, 2013

365 Other genus. *Pouillonphlebia* gen. nov. Ngô-Muller, Garrouste and Nel

366 Emended diagnosis. Very small damsel-dragonfly species characterised by the following set of
367 characters: wing length only about 13mm (autapomorphy); secondary antenodals present in
368 both rows (plesiomorphy); arculus (arc) only slightly distal of Ax1 (autapomorphy); nodus and
369 subnodus (sn) very oblique (autapomorphy); postnodals not aligned with subnodals
370 (plesiomorphy); pterostigma very short (1.5 cells) (autapomorphy), but distinctly braced
371 (plesiomorphy); discoidal cell (dc) basally closed (at least in one of the wing pairs), undivided
372 and with acute distal angle (plesiomorphy); first branching of RP recessed midway between
373 arculus and nodus (plesiomorphy); origin of IR2 below nodus (in *Pouillonphlebia* gen. nov.) or

374 more basal between arculus and subnodus (in *Burmaphlebia*); RP2 originates two cells distal
375 of nodus (autapomorphy); lestine oblique vein absent (autapomorphy); IR1 long and straight
376 (plesiomorphy); shorter convex intercalary vein between IR1 and RP2; a longer concave and a
377 shorter convex intercalary vein in the distal expanded area between IR2 and RP3/4; cubito-anal
378 field not expanded and with a single row of cells (autapomorphy); wing slender and wing base
379 only briefly stalked.

380

381 Genus *Pouillonphlebia* Ngô-Muller, Garrouste and Nel gen. nov.

382 Type species: *Pouillonphlebia burmitica* Ngô-Muller, Garrouste and Nel sp. nov.

383 *Etymology*. Named in honor of Dr. Jean-Marc Pouillon, who authorized us to study the type
384 specimen, and the Greek word phleps (gen. phlebos) for vein.

385 *Diagnosis*. Base of IR2 slightly basal to nodal brake (autapomorphy); three antenodal crossvein
386 of first row and two antenodal crossveins of second row distal of Ax2; base of RP2 less than
387 one cell distal of subnodus; a complete secondary antenodal crossvein between Ax1 and Ax2.

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390 *Pouillonphlebia burmitica* Ngô-Muller, Garrouste and Nel sp. nov.

391 (Figs 2-3)

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393 *Holotype*. MNHN.F.A71319 (1/8) (JMPB001 1/8, Collection Jean-Marc Pouillon), deposited
394 in the Muséum national d'Histoire naturelle, Paris, France.

395 *Locality and horizon*. Burmese amber (Burmite), Lower Cretaceous, lowermost Cenomanian;
396 Noije Bum 2001 Summit Site, Hukawng Valley, south-west of Maingkhwan in Kachin State
397 (26°20'N, 96°36'E) in Myanmar (Burma).

398 *Etymology*. Named after Burma.

399 *Diagnosis.* As for the genus.

400 *Description.* The fore- and hindwing of a fossil damsel-dragonfly, with missing wing apices.
401 Wings hyaline, maximum width of fore wing 3.6 mm; hindwing slightly broader than fore wing,
402 maximum width 3.8 mm; venations of both wing pairs very similar; distance arculus to nodus
403 3.6 mm (fore wing), 3.8 mm (hindwing); distance from nodus to pterostigma 6.97 mm
404 (hindwing); a very oblique nodal veinlet and oblique subnodus; two primary antenodal
405 crossveins Ax1 and Ax2 with a single well aligned secondary antenodal inbetween, distance
406 between Ax1 and Ax2 1.36 mm (fore wing), 1.27 mm (hindwing); three secondary antenodals
407 between Ax2 and nodus in first row and two in second row; three antesubnodal crossveins
408 between arculus and subnodus; nine postnodals and six postsubnodals in fore wing, six
409 postnodals and five postsubnodals in hindwing, non-aligned; pterostigma not preserved, but
410 strongly braced; discoidal cells basally closed, free (not divided by cross veins), small,
411 quadrangular with acute distal angle, that of hindwing slightly broader than that of fore wing;
412 subdiscoidal cell elongate, narrow and free; arculus angulate and very close to Ax1; sectors of
413 arculus (RP and MA) separated at origin; only a single antefurcal crossvein basal of midfork;
414 midfork (first branching of RP) recessed slightly distal of midway between discoidal cell and
415 nodus, distance between arculus and base of RP3/4 2.38 mm; origin of IR2 one long cell distal
416 of RP3/4 and below subnodus; origin of RP2 one postnodal cell distal of subnodus; lestine
417 oblique vein absent; IR1 long and straight; shorter convex intercalary vein between IR1 and
418 RP2; a longer concave and a shorter convex intercalary vein in distal expanded area between
419 IR2 and RP3/4; cubito-anal field not expanded and with a single row of cells.
420 Two complete segments of abdomen (probably third and fourth) plus distal half of second and
421 a fragment of fifth; small spines on dorsal crest and on intertegmental sutures of segments. No
422 trace of a secondary genital abdominal apparatus on second segment (probably a female).

423 *Discussion.* *Pouillonphlebia* gen. nov. has nearly all the diagnostic characters of the
424 monospecific Burmese amber family Burmaphlebiidae as defined in Bechly and Poinar (2013)
425 (see emended diagnosis above). Only the character ‘pterostigma very short (1.5 cells long)’ is
426 unknown in *Pouillonphlebia* gen. nov.

427 Bechly and Poinar (2013) already discussed the position of *Burmaphlebia* and concluded that
428 it can be placed into the Epiproctophora (‘Anisozygoptera’ + Anisoptera), and more precisely
429 in the superfamily Epiophlebioidea. We confirm the hypothesis of these authors about the
430 presence of a basally closed discoidal cell in both wing pairs.

431 *Pouillonphlebia* gen. nov. differs from *Burmaphlebia reifi* Bechly and Poinar, 2013 in the base
432 of IR2 slightly basal to nodal brake, while it is recessed midway between arculus and nodus in
433 the later. This character of *Pouillonphlebia* gen. nov. is remarkable because the base of IR2 is
434 generally much more basal in the Epiproctophora and especially in the extant Epiophlebiidae.
435 *Pouillonphlebia* gen. nov. has also three antenodal crossvein of first row distal of Ax2 instead
436 of two in the later; and the base of RP2 is less than one cell distal of subnodus instead of being
437 one postnodal cell in *Burmaphlebia reifi*. The first character is sufficient for a generic separation
438 between *Pouillonphlebia* gen. nov. and *Burmaphlebia*.

439

440 Order: Psocodea Hennig, 1953

441 Suborder: Troctomorpha Roesler, 1944

442 Family: Compsocidae Mockford, 1967

443 Genus ***Burmacompsocus*** Nel and Waller, 2007

444 Type species. *Burmacompsocus perreai* Nel and Waller, 2007; other species.

445 *Burmacompsocus coniugans* Sroka and Nel, 2017, *Burmacompsocus pouilloni* sp. nov.

446

447 ***Burmacompsocus pouilloni*** Ngô-Muller, Garrouste and Nel sp. nov.

448 (Fig. 4)

449 urn:lsid:zoobank.org:pub: xxxx

450 *Holotype*. MNHN.F.A71319 (2/8) (JMPB001 2/8, Collection Jean-Marc Pouillon, in the same
451 piece of amber with the damsel-dragonfly, showing three legs of the same side attached to
452 fragments of thorax; fore- and hindwings situated apart), deposited in the Muséum national
453 d'Histoire naturelle, Paris, France.

454 *Locality and horizon*. Burmese amber (Burmite), Lower Cretaceous, lowermost Cenomanian;
455 Noije Bum 2001 Summit Site, Hukawng Valley, south-west of Maingkhwan in Kachin State
456 (26°20'N, 96°36'E) in Myanmar (Burma).

457 *Etymology*. Named in honor of Dr. Jean-Marc Pouillon, who authorized us to study the type
458 specimen.

459 *Diagnosis*. M not fused to RP; a deep area between branches of RP (ratio distance between
460 apices of RP1 and RP2 / distance between apex of RP2 and fork of RP = 2.75); a deep area
461 between M2 and M3 (ratio distance between apices of M2 and M3 / distance between apex of
462 M2 and base of M1+2 = 4.2).

463 *Description*. Fore wing hyaline, glabrous, micro-vestitute of membrane in form of short points,
464 wing 1.74 mm long, 0.64 mm wide; pterostigma closed basally, not sclerotized, 0.32 mm long;
465 areola postica 0.43 mm long, 0.12 mm wide, not joined to M by a crossvein; M not fused to Rs;
466 nodulus present; two anal veins not fused distally.

467 Hindwing hyaline, 1.5 mm long; first segment of Rs absent; vein M two-branched.

468 All tarsi three-segmented, t1 the longest; pretarsal claw with two preapical denticles; pulvillus
469 not visible.

470 *Discussion*. Because of the incompleteness of this fossil, we can only use the leg and wing
471 venation characters to determine its affinities. Nevertheless, according to Smithers' works
472 (1972, 1990) on psocopteran families, *Burmacompsocus pouilloni* sp. nov. falls into the family

473 Compsocidae due to the following diagnostic features: macropterous; tarsi three-segmented;
474 body (preserved parts) and wings without flattened scales; fore wing venation not reduced to
475 two parallel, partially evanescent, longitudinal veins; pterostigmal cell closed basally and not
476 thickened or more opaque than the rest of the membrane; fore wing with a nodulus; fore wing
477 with two anal veins; hindwing with M forked; tarsal claws with one preapical tooth, claws of
478 each pair similar to one another. The absence of the first section of RP in hindwing and the
479 forewing membrane with fine points excludes affinities with the extant genus *Compsocus*
480 Banks, 1930. The fore wing anal veins not joining plus the vein M bifurcating into M1+2 and
481 M3 would let it fall near the Burmese amber genus *Burmacompsocus* Nel and Waller, 2007
482 (Azar et al., 2016). *Burmacompsocus pouilloni* differs from *Burmacompsocus coniugans* in the
483 very long branches of M. *Burmacompsocus pouilloni* is clearly more closely related to
484 *Burmacompsocus perreai*, with which it shares longer branches of M. Nevertheless,
485 *Burmacompsocus pouilloni* differs from the later in the deeper area between the branches of RP
486 (ratio distance between apices of RP1 and RP2 / distance between apex of RP2 and fork of RP
487 = 2.75 in *B. pouilloni* contra 2.1 in *B. perreai*). The area between M2 and M3 is also deeper
488 in *B. pouilloni* than in *B. perreai*, viz. ratio distance between apices of M2 and M3 / distance
489 between apex of M2 and base of M1+2 = 4.2 in *B. pouilloni* contra 2.5 in *B. perreai* (compare
490 Fig. 4 with the photograph of the type of *B. perreai* on internet site
491 <https://mediaphoto.mnhn.fr/media/1548340289885P3qcMA6HT2KMulSm>). Therefore we
492 consider our fossil as a new species of *Burmacompsocus*.

493

494 **4. Conclusion**

495 *Pouillonphlebia* gen. nov. is the second taxon of this family only currently recorded from the
496 Burmese amber. Bechly and Poinar (2013) considered that the Epiophlebioidea are Liassic; thus
497 their presence in the 'mid'-Cretaceous of Myanmar is not surprising. The small family

498 Burmaphlebiidae possibly appeared and diversified during the Early Cretaceous in the Burmese
499 island that was in the ‘middle’ of the Tethys Ocean at that time. *Burmacompsocus pouilloni* sp.
500 nov. is the fourth accurate compsocid species in the Burmese amber, in two extinct genera,
501 while this family comprises only two extant genera and species. It confirms that this family was
502 much more diverse during the Cretaceous than nowadays.

503

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508

509

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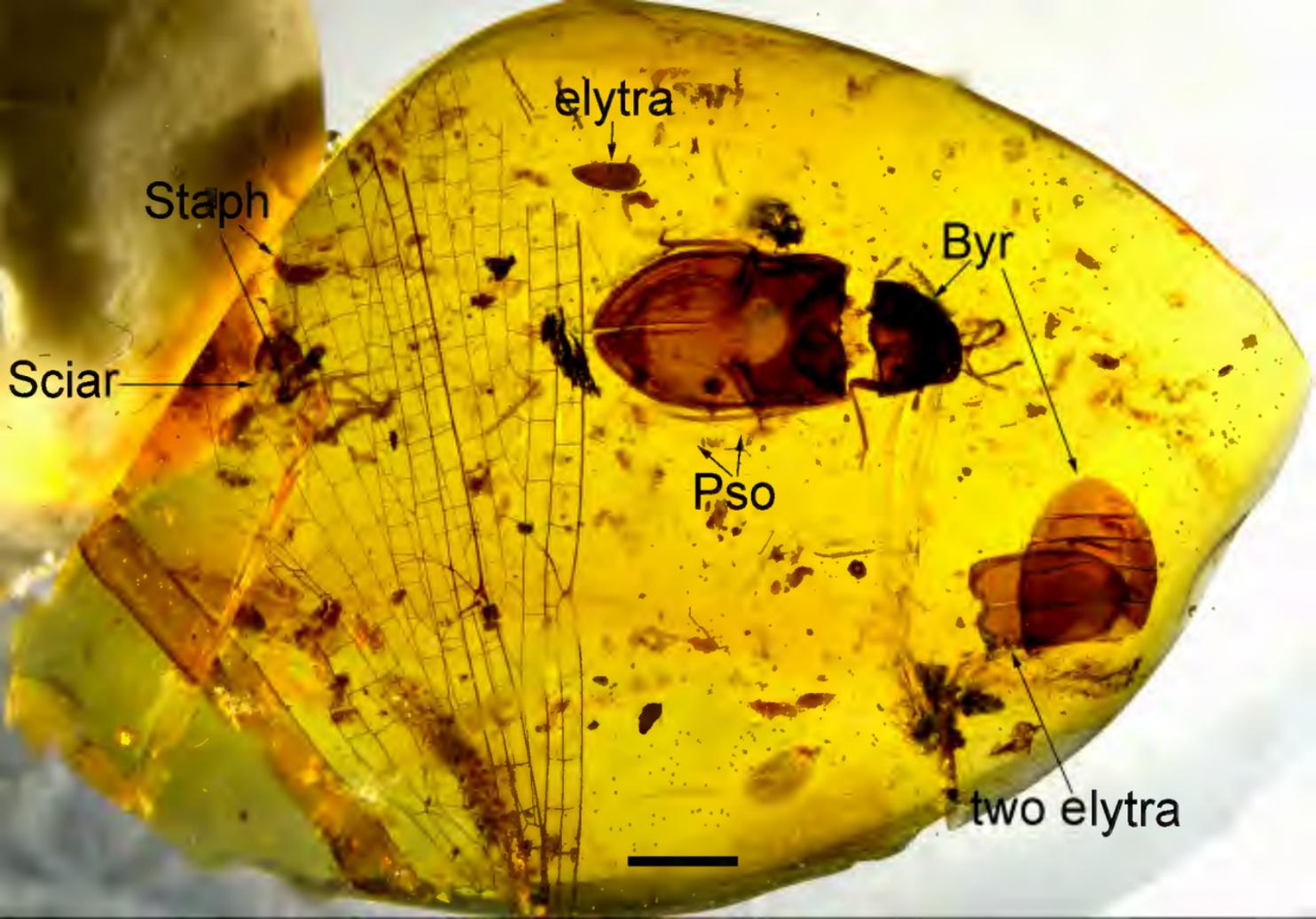
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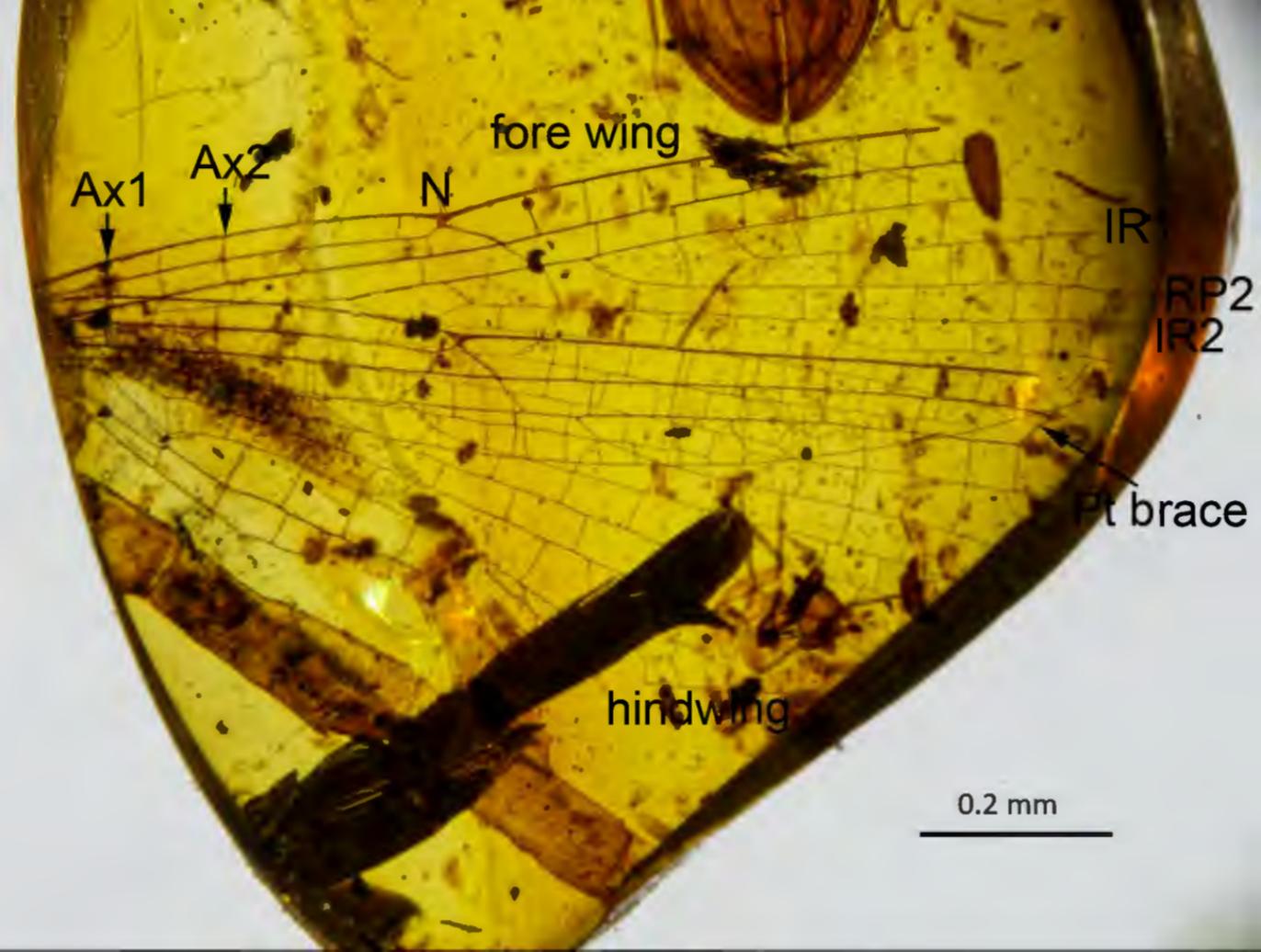
560 **Fig. 1.** MNHN.F.A71319, general view, Byr Byrroidea, Sciar Sciaridae, Staph Staphylinidae,
561 Pso Psocodea. Scale bar represents 2 mm.

562 **Fig. 2.** *Pouillonphlebia burmitica* gen. et sp. nov., holotype MNHN.F.A71319 (1/8). Habitus.
563 Scale bar represents 0.2 mm.

564 **Fig. 3.** *Pouillonphlebia burmitica* gen. et sp. nov., holotype MNHN.F.A71319 (1/8). (A)
565 drawing of forewing; (B) drawing of hindwing. Scale bars represent 1 mm.

566 **Fig. 4.** *Burmacompsocus pouilloni* sp. nov., holotype MNHN.F.A71319 (2/8). (A) two wings
567 with legs and thorax; (B) second hindwing; (C) hind leg. Scale bars represent 0.5 mm (A, B);
568 0.2 mm (C).





fore wing

Ax1

Ax2

N

IR

RP2
IR2

Pt brace

hindwing

0.2 mm

