Cretaceous Research 150 (2023) 105585

Contents lists available at ScienceDirect

Cretaceous Research

journal homepage: www.elsevier.com/locate/CretRes

Short communication

Dumpyawnus hpungwanus gen. et sp. nov., the second genus and species of Katlasidae (Hemiptera: Fulgoromorpha: Fulgoridoidea) from mid-Cretaceous Kachin amber, northern Myanmar

Xin Zhang [a, b], Cihang Luo [a, b, *], Zhishun Song [c], Jacek Szwedo [d, **]

[a] State Key Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology and Center for Excellence in Life and Paleoenvironment, Chinese Academy of Sciences, 39 East Beijing Road, Nanjing 210008, China

[b] University of Chinese Academy of Sciences, Beijing 100049, China

[c] Institute of Insect Resources and Biodiversity, School of Life Sciences, Chemistry & Chemical Engineering, Jiangsu Second Normal University, Nanjing 210013, China

[d] Laboratory of Evolutionary Entomology and Museum of Amber Inclusions, Department of Invertebrate Zoology and Parasitology, Faculty of Biology, University of Gdansk, 59, Wita Stwosza Street, PL80-308 Gdansk, Poland

A R T I C L E I N F O

Article history:
Received 6 January 2023
Received in revised form
27 April 2023
Accepted in revised form 20 May 2023
Available online 25 May 2023

Keywords:
Insect
Myanmar
Taxonomy
Mesozoic
New genus
New species

A B S T R A C T

The second genus and species of the planthopper family Katlasidae, *Dumpyawnus hpungwanus* gen. et sp. nov., is described from mid-Cretaceous Kachin (Burmese) amber. It can be definitely attributed to Katlasidae mainly based on its tegminal structure (*e.g.*, costal area absent, clavus closed, tegmen widened at membrane, multiplied forked of ScP + RA, MP and CuA_2, single CuA_1, nodal line absent) and hind wing venation (*e.g.*, ScP + RA, RP, MP and CuA with 3–5 terminals), but the new genus is clearly different from *Katlasus* Luo, Jiang et Szwedo, 2020, the type genus of Katlasidae, according to its wing venation (*e.g.*, terminals of ScP + RA usually forked, MP with less terminals). The morphological features and placement of the new taxon are briefly discussed.

1. Introduction

The planthoppers in the mid-Cretaceous Kachin amber, or Burmese amber *sensu stricto*, have already displayed great diversity (Bourgoin, 2023). Many extinct planthopper families are exclusively found from it, *viz.*, fulgoridioidean families Dorytocidae (Emeljanov and Shcherbakov, 2018; Song et al., 2021), Fulgoridiidae (Poinar et al., 2022), Inoderbidae (Shcherbakov and Emeljanov, 2021; Luo et al., 2022) and Katlasidae (Luo et al., 2020b); delphacoidean family Cixiidae (Luo et al., 2021; Wang et al., 2022); and fulgoroidean families Achilidae (Cockerell, 1917; Szwedo, 2004; Brysz et al., 2023), Derbidae (Emeljanov and Shcherbakov, 2020), and Yetkhatidae (Song et al., 2019). Other families have also been reported from Kachin amber (Ross, 2023), *viz.*, Jubisentidae Zhang, Ren et Yao, 2019, Mimarachnidae Shcherbakov, 2007, and Perforissidae Shcherbakov, 2007, these families remain currently nonplaced in *incertae sedis* position under the Eucixioidian lineage (Bourgoin and Szwedo, 2022, 2023).

The Katlasidae Luo, Jiang et Szwedo, 2020 is a recently established planthopper family only based on an isolated specimen from the mid-Cretaceous Kachin amber (Luo et al., 2020b). It was originally considered as an intermediate taxon within the superfamily Fulgoroidea, but according to the most recent classification of planthoppers, it was transferred to a newly established superfamily Fulgoridioidea Handlirsch, 1939 (Bourgoin and Szwedo, 2022, 2023).

Herein we describe the second genus and species of this family, *Dumpyawnus hpungwanus* gen. et sp. nov., from mid-Cretaceous Kachin amber in Myanmar.

* Corresponding author.
** Corresponding author.
E-mail addresses: chluo@nigpas.ac.cn (C. Luo), jacek.szwedo@biol.ug.edu.pl (J. Szwedo).

https://doi.org/10.1016/j.cretres.2023.105585
0195-6671/

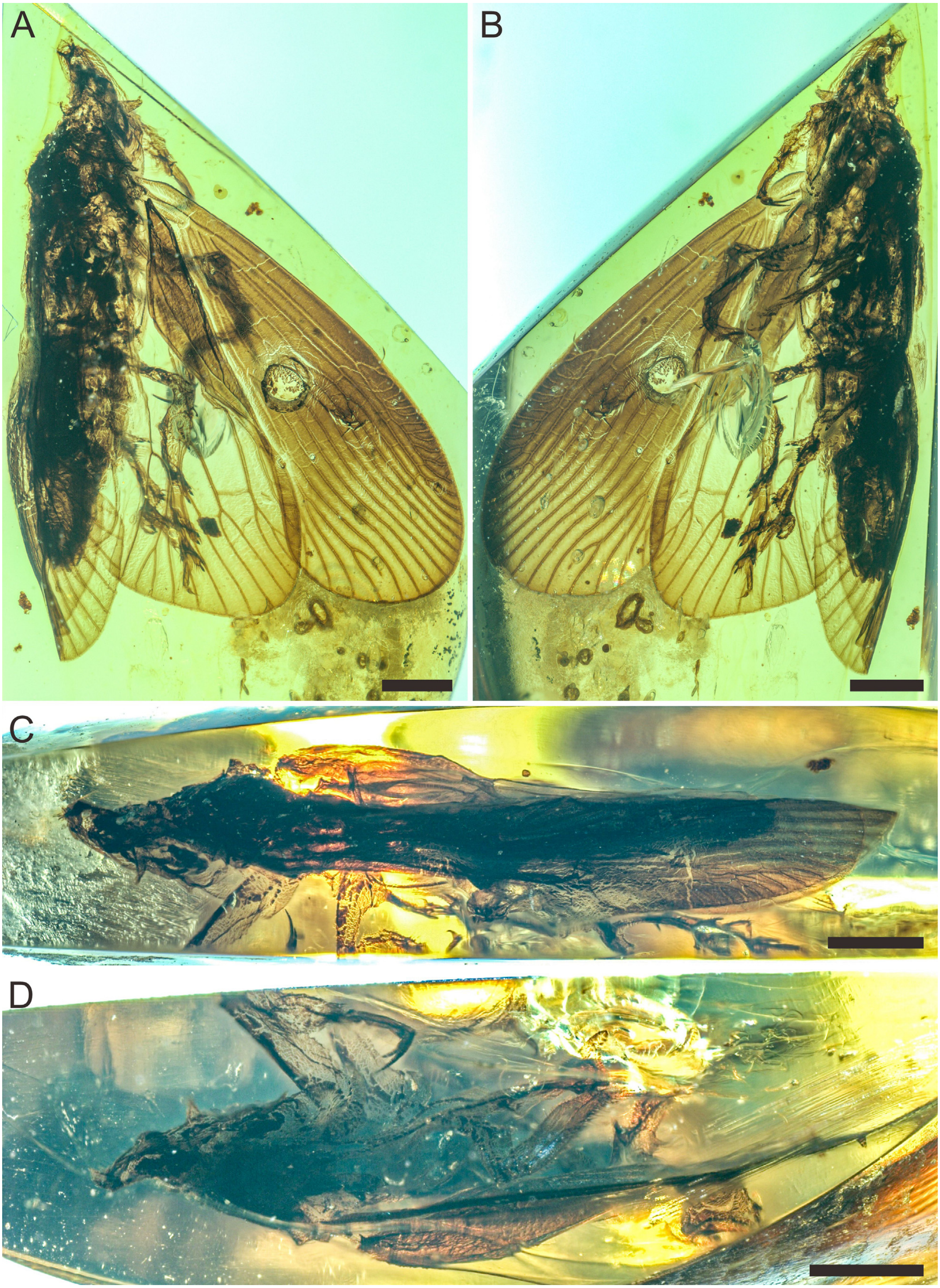

Fig. 1. Holotype of *Dumpyawnus hpungwanus* gen. et sp. nov. (NIGP201893). A, right lateral view. B, left lateral view. C, dorsal-lateral view D, ventral-lateral view. Scale bars = 1 mm.

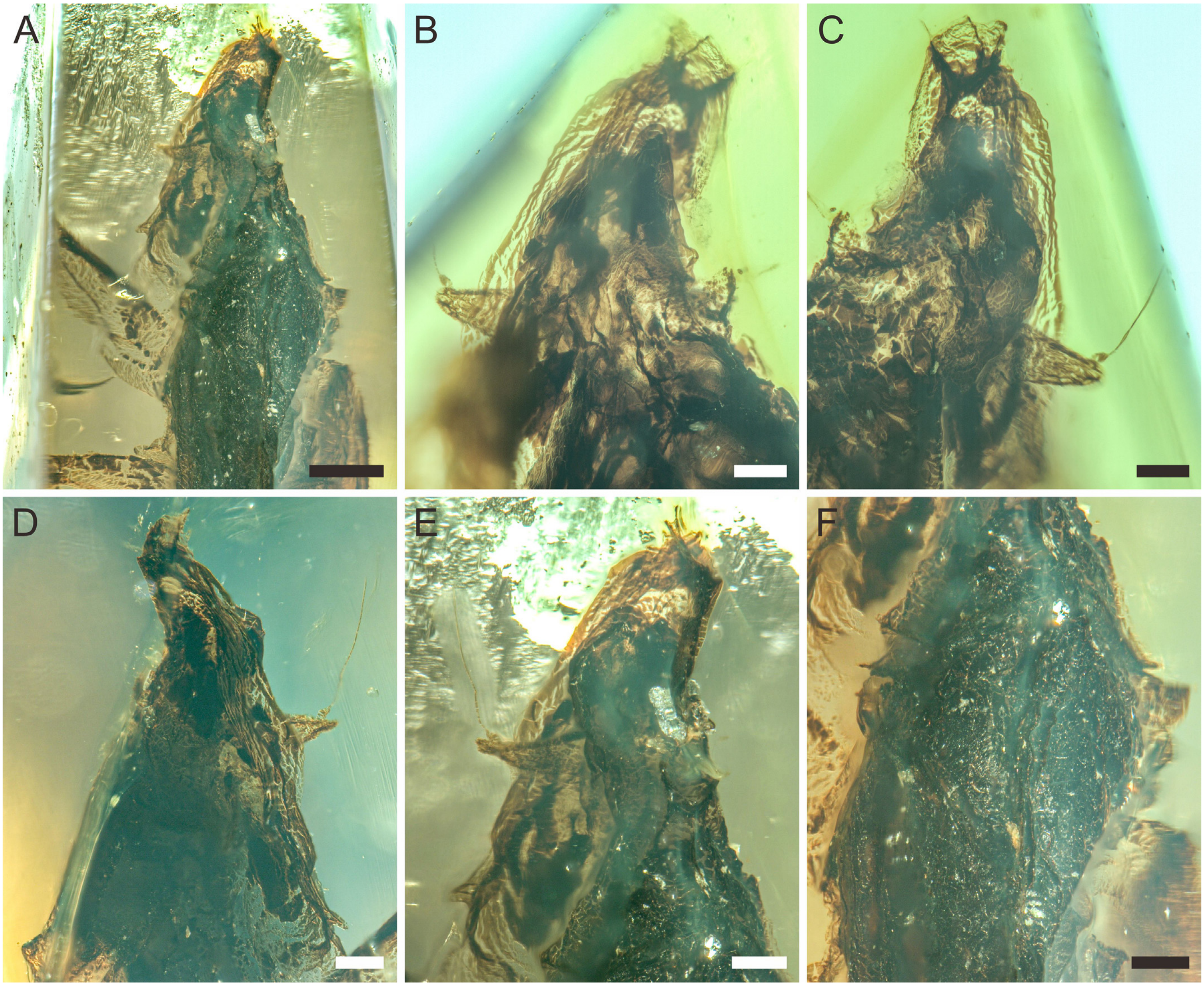

Fig. 2. Detailed photographs of the head, pronotum and mesonotum of *Dumpyawnus hpungwanus* gen. et sp. nov. (NIGP201893). A, head, pronotum and mesonotum in dorsal-lateral view. B, head in left lateral view. C, head in right lateral view. D, head in ventral-lateral view. E, head and pronotum in dorsal-lateral view. F, mesonotum in dorsal-lateral view. Scale bars for A = 0.5 mm, B–F = 0.2 mm.

2. Material and methods

The studied specimen comes from an Cretaceous amber mine, near Danai (Tanai) Town (26°21′33.41″ N, 96°43′11.88″ E; palaeolatitude 5.0 ± 4.7° S) in the Hukawng Valley of Myanmar, see Fig. 1 in Jiang et al. (2019) (Thu and Zaw, 2017; Westerweel et al., 2019). Over the past 100 years, and particularly in the last two decades, Kachin amber has received worldwide scientific interest. More than 600 invertebrates, vertebrates, protists, plants, and fungi families have been reported (Ross, 2023). Radiometric U–Pb zircon dating of the volcaniclastic matrix of the amber constrained a refined age of 98.79 ± 0.62 Ma (earliest Cenomanian) (Shi et al., 2012), which is also supported by the ammonite trapped in the amber (Yu et al., 2019).

The amber piece was collected in 2015. It is now deposited in the Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences (NIGPAS), Nanjing, China (see appended ‘Museum Catalogue entry’ in Supplementary material).

Observations were performed using a Zeiss Stemi 508 microscope. The photographs were taken with a Zeiss Stereo Discovery V16 microscope system in the Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing, China; and measurements were taken using Zen software. Photomicrographic composites of about 50 individual focal planes were digitally stacked as obtained using the software Helicon Focus 6.7.1 for a better illustration of 3D structures. Photographs were adjusted using Adobe Lightroom Classic and line drawings were prepared using CorelDraw 2019 graphic software.

The venational nomenclature follows Bourgoin et al. (2015): CA, costal margin (costa anterior); Pc + CP, precosta + costa posterior; ScP + R, subcosta posterior + radius; RA, radius anterior; RP, radius posterior; MP, media posterior; CuA, cubitus anterior; CuP, cubitus posterior; Pcu, postcubitus; A_1, first anal vein; A_2, second anal vein. The morphological terminology used in this study mostly follows Luo et al. (2020b).

3. Systematic palaeontology

Order Hemiptera Linnaeus, 1758
Suborder Fulgoromorpha Evans, 1946

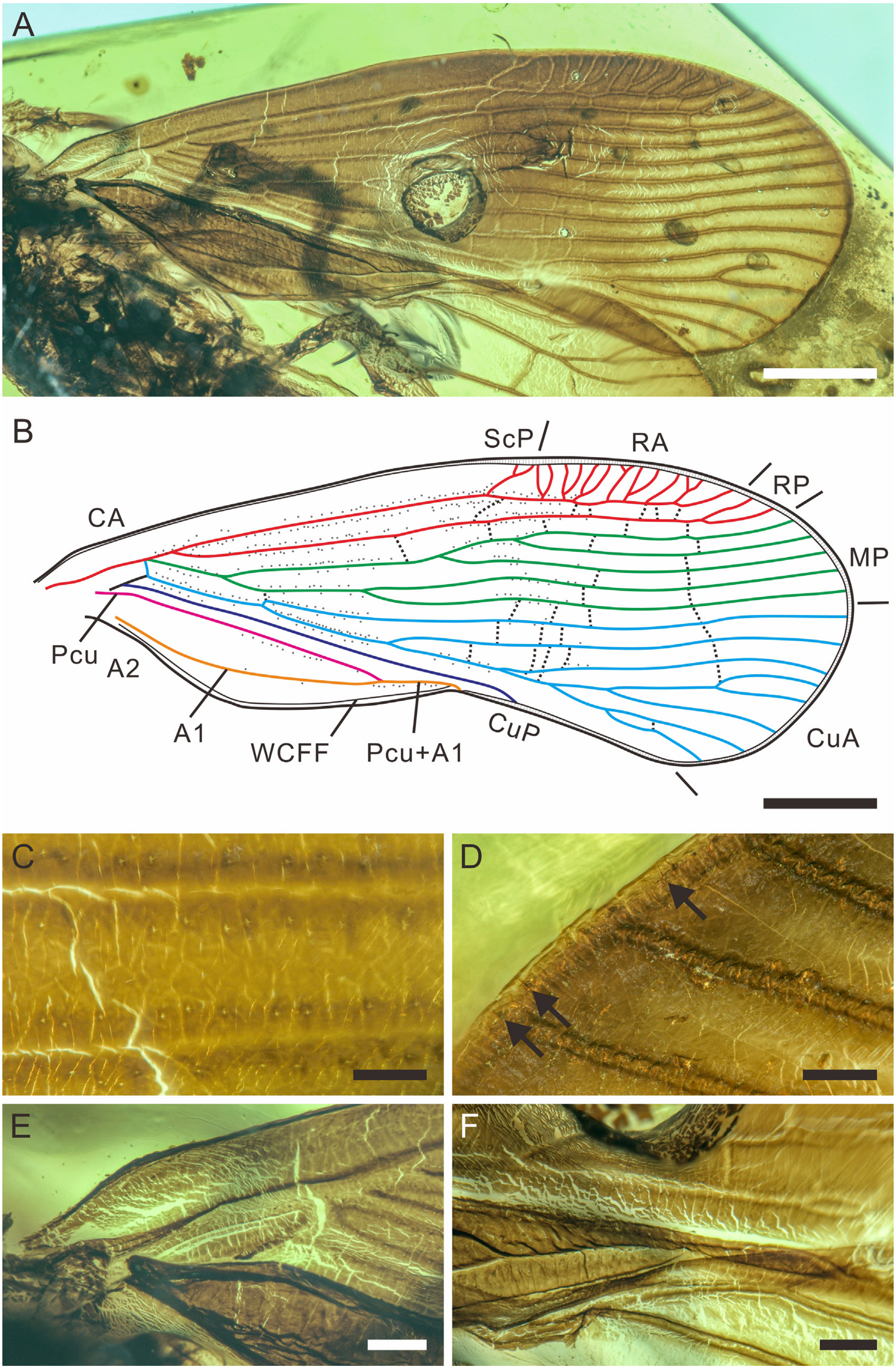

Fig. 3. Detailed photographs and line drawing of the tegmen of *Dumpyawnus hpungwanus* gen. et sp. nov. (NIGP201893). A, right tegmen. B, line drawing of the right tegmen. C, very small tubercles around the tegminal veins (arrowed). D, very small setae around the tegminal margin. E, basal cell. F, claval apex. Scale bars for A, B = 1.0 mm, E, F = 0.2 mm. C, D = 0.1 mm.

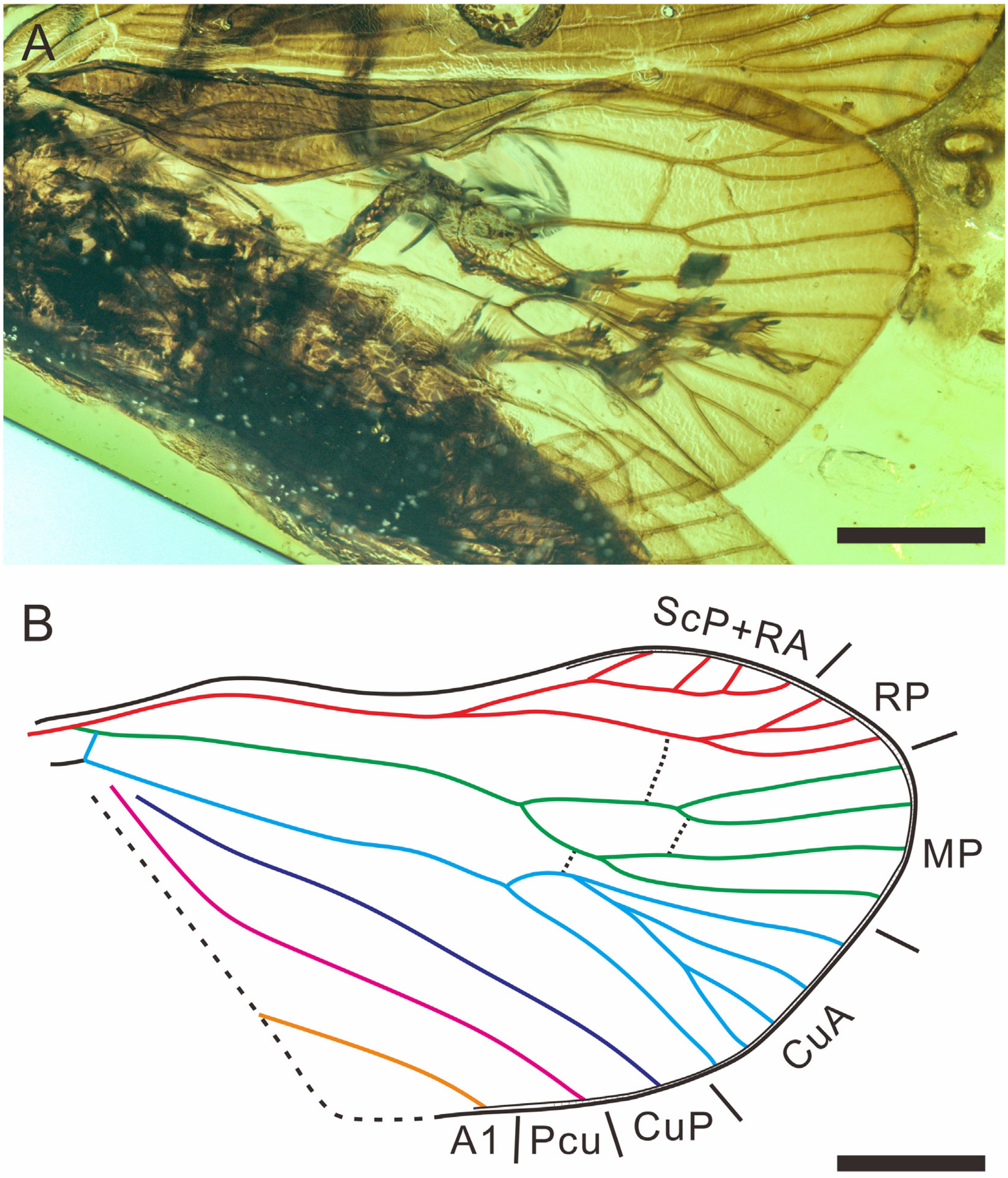

Fig. 4. Detailed photographs and line drawing of the hind wing of *Dumpyawnus hpungwanus* gen. et sp. nov. (NIGP201893). A, right hind wing. B, line drawing of the right hind wing. Scale bars = 1.0 mm.

Superfamily Fulgoridioidea Handlirsch, 1939
Family Katlasidae Luo, Jiang et Szwedo, 2020 in (Luo et al., 2020b)

Genus *Dumpyawnus* Zhang, Luo et Szwedo, gen. nov. (Figs. 1–6)
urn:lsid:zoobank.org:act:7720041E-3792-4DC9-B688-EA5C851BC0E9

Etymology. The generic name is derived from verb in Kachin language '*dumpyawn*' (from pyawn, to be side by side) meaning 'to run or be parallel' and refers to characteristic pattern of veins on tegmen. Gender: masculine.
Type species. Dumpyawnus hpungwanus Zhang, Luo et Szwedo, sp. nov.; by present designation and monotypy.
Included species. Type species only.
Diagnosis. Antennal pedicel cone-shaped (pedicel barrel-like in *Katlasus*); rostrum clearly exceeding metacoxae (rostrum reaching metacoxae in *Katlasus*); tegmen with numerous very small tubercles along veins, more or less alternatively distributed on each side of vein; terminals of ScP + RA usually forked (not forked in *Katlasus*); tegmen with short one *mp-cua* veinlet on corium at about ¼ of tegmen length (no such veinlet in *Katlasus*); branch MP_{1+2} with three terminals (10 terminals in *Katlasus*); MP_{3+4} with 2 terminals (4 terminals in *Katlasus*); hind wing with 3 terminals of RP (5 terminals of RP in *Katlasus*); CuA with 5 terminals (3 terminals in *Katlasus*); metatibia with 3 distinct lateral spines (one lateral spine in *Katlasus*).
Horizon and locality. Mid-Cretaceous (upper Albian–lower Cenomanian); amber from Kachin State, northern Myanmar.

Dumpyawnus hpungwanus Zhang, Luo et Szwedo, sp. nov. (Figs. 1–6)

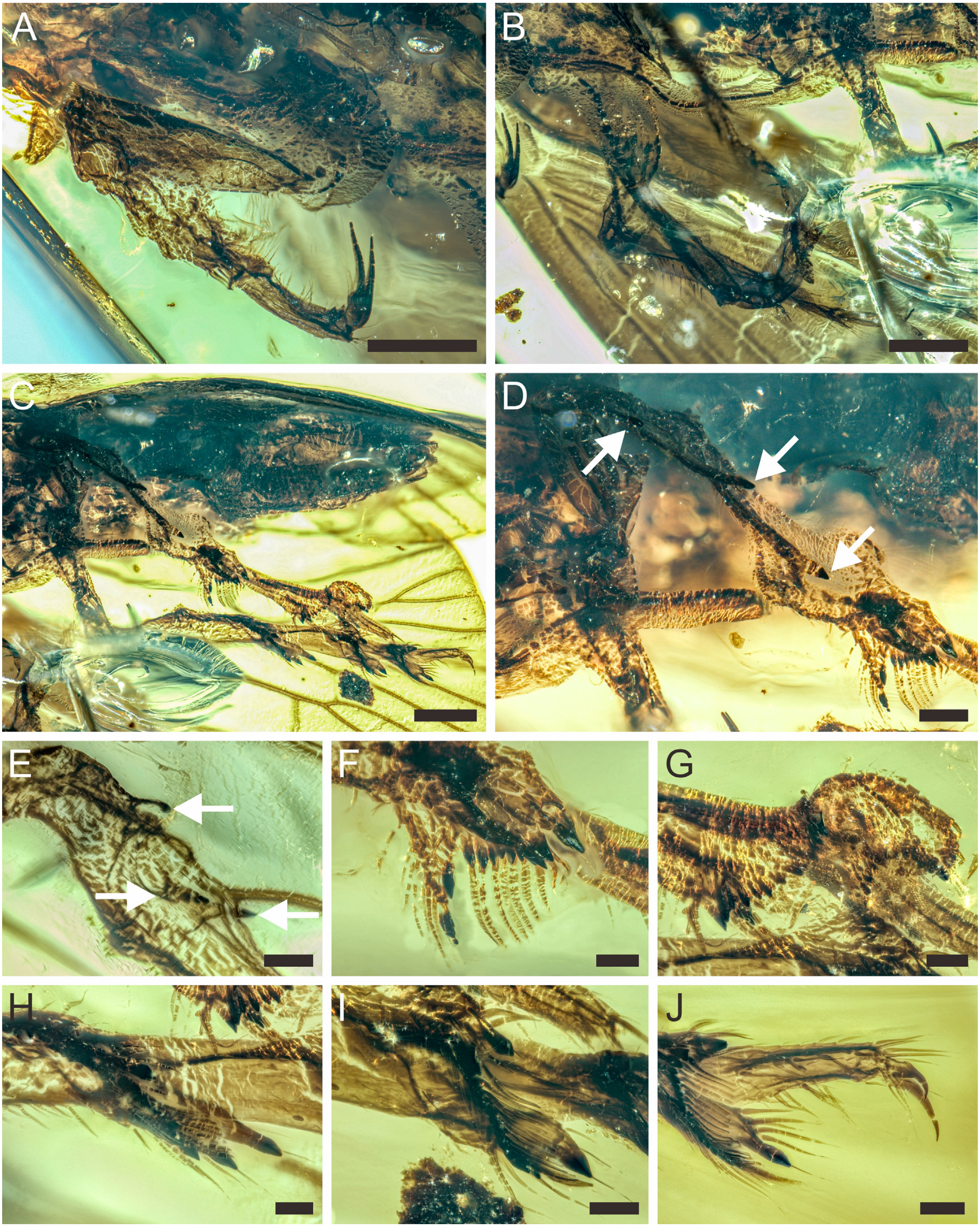

Fig. 5. Detailed photographs of legs and abdomen of *Dumpyawnus hpungwanus* gen. et sp. nov. (NIGP201893). A, left fore leg. B, twisted mid leg. C, hind leg. D, left metatibia, noting 3 lateral spines (arrowed). E, enlarged right metatibia, noting 3 lateral spines (arrowed). F, apical teeth of left metatibia. G, apical teeth of left basimetatarsomere and mesometatarsomere. H, apical teeth of right metatibia. I, apical teeth of right basimetatarsomere. J, apical teeth of right mesometatarsomere. Scale bars for A–C = 0.5 mm, D = 0.2 mm. E–J = 0.1 mm.

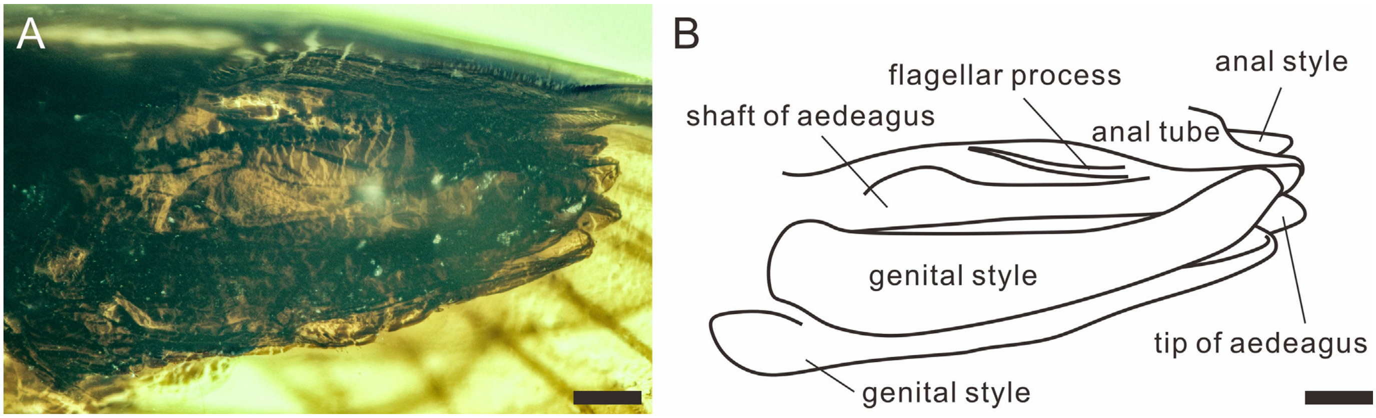

Fig. 6. Male terminalia of *Dumpyawnus hpungwanus* gen. et sp. nov. (NIGP201893). A, photograph. B, line drawing. Scale bars = 0.2 mm.

urn:lsid:zoobank.org:act:B10F95A5-B347-45D9-BF2D-AD3E855B802C

Etymology. The specific name is derived from a word in Kachin language, 'hpungwan', meaning to boil or bulled, as water, and refers to preservation of the specimen.
Material. Holotype. Kachin amber, cabochon, 14 × 6 × 3 mm. Specimen No. NIGP 201893, deposited in Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing.
Locality and horizon. Burmese amber, from deposits near Tanai Village in the Hukawng Valley of northern Myanmar, upper Albian–lower Cenomanian (mid-Cretaceous).
Diagnosis. As for genus.
Description (Measurement see Table 1). Adult, male (Fig. 1). Vertex moderately elongate (Fig. 2A–C, E). Frons elongate, gradually diverging downwards. Clypeus gradually converging downwards (Fig. 2D). Rostrum clearly exceeding metacoxae. Compound eyes bulging laterally, anterior margin distinctly exceeding half of head length. Antennal pedicel cone-shaped; flagellum swelled at basal part, then whip-like (Fig. 2B–E).

Pronotum saddle-shaped, anterior margin concave, posterior margin strongly convex (Fig. 2E). Mesonotum transversely lozenge-shaped, with double median carinae (?) (Fig. 2F).

Tegula relatively large.

Tegmen (Fig. 3) macropterous, membranous, translucent, brown at basal ¾ of its length and becoming brighter at distal ¼ of its length, broadest at slightly apicad of ¾ of tegminal length, about 2.7 times as long as wide (Fig. 3A, B). Veins bearing numerous very small tubercles, more or less alternatively distributed on each side of vein (Fig. 3C). Costal margin slightly arcuate at base, then slightly arcuate; anteroapical angle widely rounded, posteroapical angle rounded, apical margin mildly rounded, tornus arcuate, claval margin slightly concave, postclaval margin slightly arcuate, then concave. Margin of tegmen surrounded by ambient vein from basal part of costal margin to end of Pcu + A_1, with densely transverse veins between ambient vein and margin from slightly before distal end of costal area to claval apex; tegminal margin surrounded by very small setae (Fig. 3D). Basal cell elongated, about four times as long as wide (Fig. 3E). Stems ScP + R and MP leaving basal cell from same point (terminal of basal cell). Stems ScP + RA and RP with a short common stalk, then forked; stem ScP + RA slightly convex, subparallel to costal margin, then forked at slightly apicad ½ of tegminal length; branch ScP with 2 terminals, branch RA with 13 terminals reaching margin basad of anteroapical angle; branch RP slightly sinuate, forked very late, at about $^5/_6$ of tegminal length, reaching margin with 2 terminals, at about anteroapical angle. Stem MP leaving basal cell with a short stalk, about ¾ as long as basal cell, reaching margin with 5 terminals in total; stem MP straight, then forked at slightly basad of ¼ of tegminal length; branch MP_{1+2} slightly arcuate at base, then almost straight, then slightly concave, then forked at about ½ of tegminal length; MP_1 arcuate, then forked, reaching margin with 2 terminals; MP_2 sinuate, single; branch MP_{3+4} slightly concave, then straight, then forked at $^2/_5$ of tegminal length; MP_3 sinuate, single; MP_4 sinuate, single. Stem CuA with 8 terminals in total; stem CuA almost straight with a small arch, then forked at slightly apicad of ¼ of tegminal length; branch CuA_1 arched at base then sinuate, single; branch CuA_2 straight, then

Table 1
Measurements of body structures of *Dumpyawnus hpungwanus* gen. et sp. nov., holotype, NIGP201893.

Structure	Length	Width
Body	9.05 mm	/
Antennal pedicel	0.40 mm	0.18 mm
Antennal flagellum	0.69 mm	/
Right compound eye	0.43 mm	0.29 mm
Pronotum	0.45 mm	/
Mesonotum	1.31 mm	/
Tegmen	7.27 mm	2.73 mm
Basal cell	0.91 mm	0.23 mm
Cell C1	2.83 mm	0.23 mm
Cell C3	3.30 mm	0.23 mm
Cell C5	2.10 mm	0.19 mm
Hind wing	6.10 mm	3.13 mm
Left profemur	1.34 mm	0.29 mm
Left protibia	1.04 mm	0.34 mm
Right protibia	1.28 mm	0.13 mm
Right basiprotarsomere	0.41 mm	0.09 mm
Right midprotarsomere	0.19 mm	0.08 mm
Right apical tarsomere	0.25 mm	0.06 mm
Left mesotibia	1.23 mm	1.64 mm
Left basimesotarsomere	0.38 mm	0.22 mm
Left midmesotarsomere	0.29 mm	0.16 mm
Left apical mesotarsomere	0.46 mm	0.13 mm
Right basimesotarsomere	0.35 mm	0.13 mm
Right midmesotarsomere	0.38 mm	0.08 mm
Right apical mesotarsomere	0.44 mm	0.09 mm
Left metafemur	/	0.38 mm
Left metatibia	1.81 mm	0.26 mm
Left basimetatarsomere	0.88 mm	0.22 mm
Left mesometatarsomere	0.40 mm	0.29 mm
Left apical metatarsomere	0.48 mm	0.09 mm
Right metafemur	1.09 mm	0.20 mm
Right metatibia	1.52 mm	0.26 mm
Right basimetatarsomere	0.88 mm	0.23 mm
Right mesometatarsomere	0.47 mm	0.14 mm
Right apical metatarsomere	0.49 mm	0.09 mm

forked at slightly apicad of $^2/_5$ of tegminal length; CuA_{2a} sinuate, single; CuA_{2b} almost straight, then forked basad of $^3/_5$ of tegminal length, reaching margin with 6 terminals. Stem CuP slightly sinuate, then almost straight, then arcuate distally, reaching margin at about $^3/_5$ of tegminal length (Fig. 3F). Claval veins Pcu and A_1 fused at about $^2/_5$ of tegminal length, common portion Pcu + A_1 distinctly shorter (ca. ¼) than free portion of Pcu; Pcu slightly arcuate at base, then almost straight, then arcuate distally; A_1 strongly concave; common portion of Pcu + A_1 almost straight, then arcuate distally, reaching claval margin (vein A_2) at slightly apicad of ½ of tegminal length. Postclaval lobe distinct, with wing-coupling fore fold (WCFF) well developed, subparallel to postclaval margin, reaching Pcu + A_1 slightly before its terminus. Nodal line absent, postnodal line incomplete, transverse veinlets (crossveins) mostly distributed in apical half of tegmen and not arranged in regular lines. Costal area absent, postcostal cell slightly wider than cell C1; cell C1 about 3.1 times as long as basal cell, delimited posteriorly by a transverse veinlet *ir*; cell C3 longest, about 3.6 times as long as basal cell; cell C5 shortest, about 2.3 times as long as basal cell, delimited posteriorly by a transverse veinlet *icua*.

Hind wing (Fig. 4) membranous, transparent, subtriangular, shorter than tegmen, about twice as long as wide. Costal margin arcuate, then concave; anteroapical angle widely rounded, posteroapical angle rounded, apical margin mildly rounded, tornus curved, postclaval margin almost straight, then curved. Margin of hind wing surrounded by ambient vein at least from anteroapical angle to distal end of postclaval margin, with densely transverse wrinkles between ambient and margin from anteroapical angle to near distal end of postclaval margin; hind wing margin surrounded by very small setae. Basal cell present, subpentagonal. Stems ScP + R and MP separating before distal end of basal cell; stem ScP + R subparallel to margin, arcuate then curved, then forked at about ½ of tegminal length; stem ScP + RA arcuate, then forked slightly before $^2/_3$ of tegminal length, reaching margin with 4 terminals; branch RP arcuate, forked at about ¾ of tegminal length, reaching margin with 3 terminals. Stem MP slightly sinuate, then forked apicad of ½ of tegminal length; MP_{1+2} slightly arcuate, then forked slightly before ¾ of tegminal length, reaching margin with 2 terminals; MP_{3+4} concave, forked slightly before $^2/_3$ of tegminal length, reaching margin with 2 terminals. Stem CuA almost straight, then slightly arcuate, forked apicad of ½ of tegminal length; CuA_1 arcuate at base, then forked immediately, CuA_{1a} almost straight, single, CuA_{1b} slightly arcuate, then forked again, reaching margin with 3 terminals; CuA_2 slightly arcuate, single. Stem CuP slightly sinuate, single. Stem Pcu concave, single. Stem A_1 single. Transverse veinlets sparse, with one *r-m* and one *im* and one *m-cu*.

Proleg (Fig. 5A): profemur margins carinate, covered with numerous short setae; protibia narrow and long, margins carinate, covered with numerous setae, apical part dorsally incised; basiprotarsomere cylindrical, distinctly widened apicad, dorsally deeply incised, midprotarsomere subtriangular, widened apicad, dorsally deeply incised, apical tarsomere cylindrical, covered with setae; claws large, without distinct arolium. Mesoleg (Fig. 5B): mesofemur narrow and long, margins carinate, covered with numerous short setae; mesotibia narrow and long, margins carinate, covered with numerous setae; mesotarsomere distinctly narrower than mesotibia, basimesotarsomere cylindrical, dorsally incised; midmesotarsomere shortest, triangular, dorsally incised, ventrally with bunch of setae; apical mesotarsomere longest, margins carinate; claws large, without distinct arolium. Metaleg (Fig. 5C–J): metafemur narrow and long, margins carinate, covered with numerous short setae; metatibia narrow and long, margins carinate, covered with numerous setae, apical part dorsally incised, with 3 lateral spines (Fig. 5D, E), with approximately 12 apical teeth and numerous apical long setae (Fig. 5F, H); basimetatarsomere cylindrical, distinctly widened apicad, covered with numerous setae, dorsally deeply incised, with at least 18 apical teeth (2 most lateral ones distinctly larger) and numerous apical long setae (Fig. 5G, I); mesometatarsomere subtriangular, widened apicad, dorsally deeply incised, with approximately 20 apical teeth (2 most lateral ones distinctly larger) and numerous apical long setae (Fig. 5G, J); apical metatarsomere becoming narrower apicad, covered with numerous setae; claws large, without distinct arolium (Fig. 5J).

Abdomen badly preserved. Male terminalia with genital styles rounded apically, with short setae; anal tube rounded apically, slightly exceeding genital styles, with short setae; anal style rounded apically, with short setae; tip of aedeagus obtuse (Fig. 6A, B).

4. Discussion

Dumpyawnus gen. nov. can be assigned to Fulgoridioidea as currently recognized (Bourgoin and Szwedo, 2022, 2023) mainly based on the very early forking of CuA, and forking of CuA_2 distinctly basad of claval apex. Combination of other features as: head with lateral margins of frons and vertex carinate, antenna pedicel swollen and flagellum whip-like, tegmen with wrinkled peripheral membrane present and elongate basal cell, ScP + R and MP leaving basal cell from a common point, short common stem of ScP + R, costal area with terminals of RA; metatibia with lateral spines and apical teeth are shared with other taxa of Fulgoromorpha of Eucixioidean lineage (Bourgoin and Szwedo, 2022, 2023).

Dumpyawnus gen. nov. is placed in Katlasidae Luo, Jiang et Szwedo, 2020 mainly according to its tegminal structure: costal area absent, clavus closed, tornus long, tegmen widened at membrane, multiplied terminals of ScP + RA, MP and CuA_2, single CuA_1, nodal line absent, CuA_2 first fork basad of claval apex and hind wing venation with ScP + RA, RP, MP and CuA 3–5 terminals. However, the new genus *Dumpyawnus* gen. nov. clearly differs from the type genus of Katlasidae, *Katlasus* Luo, Jiang et Szwedo, 2020, based on its wings' venation (*e.g.*, branches of ScP + RA usually forked, MP with less terminals), therefore, we established a new genus for it.

The common, but striking feature of *Dumpyawnus* gen. nov. and *Katlasus* is polymerization of CuA. Such feature is present in unrelated, extinct Lalacidae: Ancorallini, but also in modern-day Achilidae: Rhotalini (both Fulgoroidea), but so far, such feature is unknown in representatives of Fulgoridioidea. Compared with the absence (or at least not so obvious) in the type genus *Katlasus*, the tegmen veins of *Dumpyawnus* gen. nov. are bearing numerous very small tubercular structures. Because of preservation conditions, it is difficult to say if these are bases of setae or structures of other function (sensorial or excretory?). Setae bearing tubercles are present in representatives of Delphacoidea, both in Cixiidae and Delphacidae (in fossils see *e.g.*, Fennah, 1987; Gebicki and Wegierek, 1993; Gebicki and Szwedo, 2000; Szwedo, 2007; Li et al., 2017; Luo et al., 2021). In those taxa, tubercles are placed along veins, and sometimes also seldom in the areas between the veins (*e.g.*, Cixiidae: Mnemosynini), including the fossil taxa (Szwedo et al., 2006). Tubercular structures and associated setae are present also in unrelated taxa of other families of Eucixioidean lineage from the Cretaceous, *viz.*, Perforissidae and Jubisentidae (Peñalver and Szwedo, 2010; Zhang et al., 2017, 2019; Luo et al., 2020a; Bourgoin and Szwedo, 2022, 2023), but also already present in the Jurassic Qiyangiricaniidae of superfamily Fulgoridioidea (Szwedo et al., 2011). Excretory tubercular structures are present and associated or not with veins in some Derbidae, Meenoplidae, and Flatidae (in Fulgoroidea, *sec.* Bourgoin and Szwedo 2022, 2023) (see *e.g.*, Stroiński and Świerczewski, 2013; Echavarria et al., 2021; Lv et al., 2021). Sensorial tubercular structures (with and without associate seta) are present *e.g.* in some Cixiidae and Delphacidae (Delphacoidea) as well as in representatives of Fulgoroidea, *e.g.* some Kinnaridae, Meenoplidae, Ricaniidae (*e.g.*, Liang, 2002; Świerczewski and Stroiński, 2017; Lv et al., 2021; Stroiński, 2021). These structures may not be homologous, and should not be regarded as synapomorphies between families. The tubercular structures of *Dumpyawnus* gen. nov. are small and numerous, and without supporting any setae (Fig. 3C). They might be glandular pore apertures or short sensilla structures rather than setae-bearing structures.

Luckily, *Dumpyawnus* gen. nov. preserved complete metatibia and metatarsomere which was not preserved in *Katlasus*. Metatibia with 3 lateral spines and a dozen or so of apical teeth, basimetatarsomere 50 percent longer than others, basimetatarsomere and mesometatarsomere with numerous apical teeth is a feature present in Fulgoridioidea (*e.g.*, in *Stonymetopus* Poinar et al., 2022), but also in Delphacoidea and part of Fulgoroidea (*e.g.*, in Achilidae, Dictyopharidae). This feature is shared among various lineages, might be related to locomotory issues (Burrows, 2014).

5. Conclusion

The second genus (*Dumpyawnus* gen. nov.) of the planthopper family Katlasidae is described from mid-Cretaceous Kachin amber. The new genus clearly differs from the type genus of Katlasidae according to its wing venation. The new genus adds to the taxonomic diversity and morphological disparity of Katlasidae, and Fulgoridioidea, and presents the examples of parallel development of similar structures in related but well differing lineages.

Acknowledgements

We thank Prof. Dr. Thierry Bourgoin (MNHN, Paris, France) and another anonymous reviewer for valuable comments that improved the paper. This research was supported by the National Natural Science Foundation of China (grant nos. 31970442), the Strategic Priority Research Program of the Chinese Academy of Sciences (XDB26000000), and the Second Tibetan Plateau Scientific Expedition and Research (2019QZKK0706). Jacek Szwedo thanks the Chinese Academy of Sciences for support under the President's International Fellowship Initiative (PIFI No. 2021VCA0009).

References

Bourgoin, T., 2023. FLOW (Fulgoromorpha Lists on the Web): a world knowledge base dedicated to Fulgoromorpha. Version 8, updated [2022-12-31]. https://flow.hemiptera-databases.org/flow/. (Accessed 1 April 2023).

Bourgoin, T., Szwedo, J., 2022. Toward a new classification of planthoppers Hemiptera Fulgoromorpha: 1. What do Fulgoridiidae really cover? Annales Zoologici 72, 951–962.

Bourgoin, T., Szwedo, J., 2023. Toward a new classification of planthoppers Hemiptera Fulgoromorpha: 2. Higher taxa, their names and their composition. Zootaxa (in press).

Bourgoin, T., Wang, R.-R., Asche, M., Hoch, H., Soulier-Perkins, A., Stroiński, A., Yap, S., Szwedo, J., 2015. From micropterism to hyperpterism: recognition strategy and standardized homology-driven terminology of the forewing venation patterns in planthoppers (Hemiptera: Fulgoromorpha). Zoomorphology 134, 63–77.

Brysz, A.M., Müller, P., Szwedo, J., 2023. First fossil representative of the tribe Amphignomini (Hemiptera: Fulgoromorpha: Achilidae) from mid-Cretaceous Kachin amber and its significance. European Journal of Entomology 120, 42–49.

Burrows, M., 2014. Jumping mechanisms in dictyopharid planthoppers (Hemiptera, Dicytyopharidae). Journal of Experimental Biology 217, 402–413.

Cockerell, T.D.A., 1917. Insects in Burmese amber. Annals of the Entomological Society of America 10, 323–329.

Echavarria, M.A.Z., Barrantes, E.A.B., Bartlett, C.R., Helmick, E.E., Bahder, B.W., 2021. A new planthopper species in the genus *Omolicna* (Hemiptera: Auchenorrhyncha: Derbidae) from the Reserva Privada el Silencio de Los Angeles Cloud Forest in Costa Rica. Zootaxa 4975, 357–368.

Emeljanov, A.F., Shcherbakov, D.E., 2018. The longest-nosed Mesozoic Fulgoroidea (Homoptera): a new family from mid-Cretaceous Burmese amber. Far Eastern Entomologist 354, 1–14.

Emeljanov, A.F., Shcherbakov, D.E., 2020. The first Mesozoic Derbidae (Homoptera: Fulgoroidea) from Cretaceous Burmese amber. Russian Entomological Journal 29 (3), 237–246.

Evans, J.W., 1946. A natural classification of leaf-hoppers (Jassoidea, Hemiptera). Part 1. External morphology and systematic position. Transactions of the Royal Entomological Society of London 96, 47–60.

Fennah, R.G., 1987. A new genus and species of Cixiidae (Homoptera: Fulgoroidea) from Lower Cretaceous amber. Journal of Natural History 21, 1237–1240.

Gebicki, C., Wegierek, P., 1993. *Oligocixia electrina* gen. et sp. nov. (Homoptera, Auchenorrhyncha, Cixiidae) from Dominican amber. Annalen des Naturhistorischen Museums in Wien. Serie A für Mineralogie und Petrographie, Geologie und Paläontologie. Anthropologie und Prähistorie 95, 121–125.

Gebicki, C., Szwedo, J., 2000. The first ugyopine planthopper *Serafinana perperunae* gen. and sp. n. from Eocene Baltic amber (Hemiptera, Fulgoroidea: Delphacidae). Polish Journal of Entomology 69 (4), 389–395.

Jiang, T., Szwedo, J., Wang, B., 2019. A unique camouflaged mimarachnid planthopper from mid-Cretaceous Burmese amber. Scientific Reports 9, 13112.

Li, Y., Liu, X., Ren, D., Li, X., Yao, Y., 2017. First report of Cixiidae insect fossils from the Miocene of the northeastern Tibetan Plateau and their palaeoenvironmental implications. Alcheringa: An Australasian Journal of Palaeontology 41, 54–60.

Liang, A.-P., 2002. Seven new species of Kinnara Distant (Hemiptera: Fulgoroidea: Kinnaridae), with notes on antennal sensilla and wax glands. Zoological Studies 41 (4), 388–402.

Linnaeus, C., 1758. Systema naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis, 10th ed. Laurentii Salvii, Holmiae [=Stockholm], p. 824.

Luo, C., Jiang, T., Szwedo, J., Wang, B., Xiao, C., 2020a. A new genus and species of Perforissidae (Hemiptera: Fulgoromorpha) from mid-Cretaceous Kachin amber. Cretaceous Research 114, 104518.

Luo, C., Jiang, T., Szwedo, J., Wang, B., Xiao, C., 2020b. A new planthopper family Katlasidae fam. nov. (Hemiptera: Fulgoromorpha: Fulgoroidea) from mid-Cretaceous Kachin amber. Cretaceous Research 115, 104532.

Luo, C., Song, Z., Liu, X., Jiang, T., Jarzembowski, E.A., Szwedo, J., 2022. Ingensalinae subfam. nov. (Hemiptera: Fulgoromorpha: Fulgoroidea: Inoderbidae), a new planthopper subfamily from mid-Cretaceous Kachin amber from Myanmar. Fossil Record 24, 455–465.

Luo, Y., Bourgoin, T., Szwedo, J., Feng, J.-N., 2021. Acrotiarini trib. nov., in the Cixiidae (Insecta, Hemiptera, Fulgoromorpha) from mid-Cretaceous amber of northern Myanmar, with new insights in the classification of the family. Cretaceous Research 128, 104959.

Lv, S.-S., Bourgoin, T., Yang, L., Chen, X.-S., 2021. Four new species of the planthopper genus *Metanigrus* Tsaur, Yang & Wilson from China (Hemiptera, Fulgoromorpha, Meenoplidae). ZooKeys 1024, 197–213.

Peñalver, E., Szwedo, J., 2010. Perforissidae (Hemiptera: Fulgoroidea) from the Lower Cretaceous San Just amber (Eastern Spain). Alavesia 3, 97–103.

Poinar Jr., G.O., Brown, A.E., Bourgoin, T., 2022. *Stonymetopus megus* gen. et sp. nov. (Hemiptera: Fulgoromorpha), the first Fulgoridiidae genus from mid-Cretaceous Burmese amber. Palaeodiversity 15 (1), 83–90.

Ross, A.J., 2023. Supplement to the Burmese (Myanmar) amber checklist and bibliography, 2022. Palaeoentomology 6 (1), 22–40.

Shcherbakov, D.E., Emeljanov, A.F., 2021. Paradoxical derbid-like planthopper (Homoptera: Fulgoroidea) from Cretaceous Burmese amber. Russian Entomological Journal 30, 135–139.

Shi, G., Grimaldi, D.A., Harlow, G.E., Wang, J., Wang, J., Yang, M., Lei, W., Li, Q., Li, X., 2012. Age constraint on Burmese amber based on U–Pb dating of zircons. Cretaceous Research 37, 155–163.

Song, Z.-S., Xu, G.-H., Liang, A.-P., Szwedo, J., Bourgoin, T., 2019. Still greater disparity in basal planthopper lineage: a new planthopper family Yetkhatidae (Hemiptera, Fulgoromorpha, Fulgoroidea) from mid-Cretaceous Myanmar amber. Cretaceous Research 101, 47–60.

Song, Z.-S., Zhang, C.-L., Xi, H.-Y., Szwedo, J., Bourgoin, T., 2021. First record of adult Dorytocidae — *Dorytocus jiaxiaoae* Song, Szwedo & Bourgoin sp. nov. (Hemiptera: Fulgoromorpha: Fulgoroidea) from mid-Cretaceous Kachin amber. Cretaceous Research 125, 104863.

Stroiński, A., 2021. *Tarehylava*, a new planthopper genus from Madagascar (Hemiptera: Fulgoromorpha: Ricaniidae). Acta Entomologica Musei Nationalis Pragae 61 (1), 329–340.

Stroiński, A., Świerczewski, D., 2013. *Peyrierasus* gen. nov. — a new genus of Flatidae (Hemiptera: Fulgoromorpha) from Southeastern Madagascar. Annales Zoologici 63, 251–262.

Szwedo, J., 2004. *Niryasaburnia* gen. nov. for '*Liburnia*' burmitina Cockerell, 1917 from Burmese amber (Hemiptera, Fulgoromorpha: Achilidae). Journal of Systematic Palaeontology 2 (2), 105–107.

Szwedo, J., 2007. *Glisachaemus jonasdamzeni* gen. et sp. nov. of Cixiidae from the Eocene Baltic amber (Hemiptera: Fulgoromorpha). Alavesia 1, 109–116.

Szwedo, J., Bourgoin, T., Lefebvre, F., 2006. New Mnemosynini taxa (Hemiptera, Fulgoromorpha: Cixiidae) from the Palaeogene of France with notes on their early association with host plants. Zootaxa 1122, 25–45.

Szwedo, J., Wang, B., Zhang, H., 2011. An extraordinary Early Jurassic planthopper from Hunan (China) representing a new family Qiyangiricaniidae fam. nov.

(Hemiptera: Fulgoromorpha: Fulgoroidea). Acta Geologica Sinica-English Edition 85, 739–748.
Świerczewski, D., Stroiński, A., 2017. A new species *Phlebopterum planicapitis* from Madagascar (Hemiptera: Fulgoromorpha: Flatidae). Polish Journal of Entomology 86 (3), 275–291.
Thu, K., Zaw, K., 2017. Chapter 23 - Gem deposits of Myanmar. In: Barber, A.J., Zaw, K., Crow, M.J. (Eds.), Myanmar: Geology, Resources and Tectonics. The Geological Society, London, UK, pp. 497–529.
Wang, M.L., Liang, F.Y., Bourgoin, T., 2022. A new cixiid fossil genus of the tribe Acrotiarini from mid-Cretaceous Burmese amber (Insecta, Hemiptera, Fulgoromorpha). Insects 13 (1), 102, 1–9.
Westerweel, J., Roperch, P., Licht, A., Dupont-Nivet, G., Win, Z., Poblete, F., Ruffet, G., Swe, H.H., Thi, M.K., Aung, D.W., 2019. Burma Terrane part of the Trans-Tethyan arc during collision with India according to palaeomagnetic data. Nature Geoscience 12, 863–868.
Yu, T.T., Kelly, R., Mu, L., Ross, A., Kennedy, J., Broly, P., Xia, F.Y., Zhang, H.C., Wang, B., Dilcher, D., 2019. An ammonite trapped in Burmese amber. Proceedings of the National Academy of Sciences of the United States of America 116, 11345–11350.
Zhang, X., Ren, D., Yao, Y., 2017. A new species of *Foveopsis* Shcherbakov (Hemiptera: Fulgoromorpha: Fulgoroidea: Perforissidae) from mid-Cretaceous Burmese amber. Cretaceous Research 79, 35–42.
Zhang, X., Ren, D., Yao, Y., 2019. A new family Jubisentidae fam. nov. (Hemiptera: Fulgoromorpha: Fulgoroidea) from the mid-Cretaceous Burmese amber. Cretaceous Research 94, 1–7.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.cretres.2023.105585.