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A new species of *Mesosticta* in mid-Cretaceous Kachin amber (Odonata: Platystictidae)

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Abstract

Mesosticta additicta **sp. nov.**, fourth species of this platystictid genus, is described from the mid-Cretaceous Kachin amber, suggesting its endemic diversification in the West Burma Block (WBB), possibly in relation to the geographic isolation of this area during the formation of mid-Cretaceous Kachin amber.

Keywords: fossil, Insecta, Mesostictinae, paleo-endimicity, Zygoptera

Introduction

Odonata are typically rare in amber deposits, particularly when compared to their record as compression fossils. However, Kachin amber stands out as an exception, hosting the majority of mid-Cretaceous Odonata specimens. Within Kachin amber, odonatans are notably abundant, with 39 described species placed into 16 families (refer to the list in Zheng, 2021). Genera described from Kachin amber are typically mono- or bispecificitic, with the exception of the platystictid genus *Mesosticta* Huang, Azar, Cai & Nel, 2015, which currently encompasses three species (Huang *et al*., 2015; Zheng *et al*., 2016, 2017). In this study, we describe a fourth species of this genus, indicating a significant diversification of this taxon on the paleo-insular system of the West Burma block (WBB).

Material and methods

The piece of amber containing the specimen derives from the deposits of Noije Bum in the Hukawng Valley (26°29′ N, 96°35′ E), Kachin State, northern Myanmar. The specimen is housed in the collections of the Nanjing Institute of Geology and Palaeontology, Chinese Academy of Science, (NIGPAS) China.

The specimen was examined with a Zeiss Axio Zoom V16 stereomicroscope with an attached Zeiss Axiocam 512 colour camera. All images are digitally stacked photomicrographic composites of several individual focal planes, which were obtained using Helicon Focus 6.7. The figures were composed with Adobe Illustrator CC2018 and Photoshop CC2018.

The nomenclature of the dragonfly wing venation used in this paper is based on the interpretations of Riek (1976) and Riek & Kukalová-Peck (1984), as modified by Nel *et al*. (1993) and Bechly (1996). The phylogeny of extant Zygoptera followed in the present work is based on Dijkstra *et al*. (2014). Wing abbreviations are as follows: AA, anal anterior; AP, anal posterior; Arc, arculus; Ax, primary antenodal crossvein; Cr, nodal crossvein; CuA, cubitus anterior; CuP, cubitus posterior; DC, discoidal cell; IR, intercalary radial vein; MA, median anterior; MP, median posterior; N, nodus; Pt, pterostigma; RA, radius anterior; RP, radius posterior; ScP, subcosta posterior; Sn, subnodal crossvein. The published work and nomenclatural acts are registered in ZooBank with the following LSID: urn:lsid:zoobank.org:pub:A4832A4B-D8E8-4047-A50C-8B8F09C4CBE1.

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Systematic palaeontology

Order Odonata Fabricius, 1793
Suborder Zygoptera Selys-Longchamps, 1854
Superfamily Platystictoidea Kennedy, 1920
Family Platystictidae Kennedy, 1920
Subfamily Mesostictinae Zheng, Wang, Nel, Jarzembowski, Zhang & Chang, 2019

Type genus. *Mesosticta* Huang, Azar, Cai & Nel, 2015

Genus *Mesosticta* Huang, Azar, Cai & Nel, 2015

Type species. *Mesosticta burmatica* Huang, Azar, Cai & Nel, 2015.

Other species. *Mesosticta electronica* Zheng, Zhang, Chang & Wang, 2016; *Mesosticta davidattenboroughi* Zheng, Wang, Nel, Jarzembowski, Zhang, & Chang, 2019, *Mesosticta additicta* **sp. nov.**

***Mesosticta additicta* sp. nov.**
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(Figs 1, 2)

Material. Holotype NIGP204970, in a rectangular piece of amber measuring 41 × 35 × 3 mm, with an undetermined larva, a poorly preserved pseudoscorpion, and several poorly preserved insects as syninclusions.

Etymology. Named after the Latin '*additicta*' because it is a further new species in this genus.

Diagnosis. Vein MP of forewing ending at level of first crossvein between IR2 and RP2 and one cell distad this crossvein in hind wing; apex of MAa ending two cells basad level of pterostigma; subdiscoidal cell not crossed in fore- and hindwings; Arc slightly distal of Ax2.

Locality and horizon. Noije Bum Hill, Hukawng Valley, Kachin State, Myanmar; upper Albian to lower Cenomanian, mid-Cretaceous.

Description. Fragments of head and thorax visible. All legs preserved, claws with one preapical tooth, hind leg with femur 2.1 mm long, tibia 2.05 mm long, tarsus about 0.8 mm long, claw about 0.2 mm long. Wings complete, hyaline, preserved in life position.

Forewing length 11.35 mm, width at level of N about 0.95 mm; length from wing base to Arc 2.5 mm, from Arc to N about 1.3 mm, from N to Pt about 5.95 mm, from Pt to wing apex about 1.55 mm. Primary antenodal crossveins preserved, Ax2 about 0.85 mm distal of Ax1; no secondary antenodal crossveins present. Nine postnodal crossveins and eight postsubnodal crossveins present proximal to Pt, somewhat aligned. Five postnodal crossveins and three postsubnodal crossveins present distal of Pt, non-aligned. Arc angular and slightly distad Ax2. DC basally closed, free, elongate and quadrangular, 0.57 mm long and maximum 0.13 mm wide. Subdiscoidal cell free and elongate, 0.91 mm long and maximum 0.2 mm wide. AA separated from AP at mid distance between Ax1 and Ax2, ending on distal angle of DC. Nodal structures well preserved, with Sn aligned with Cr. Midfork (base of RP3/4) opposite distal end of Sn. IR2 slightly distad Sn, one cell and about 0.05 mm distad meeting point of Sn and RP. RP2 four cells distal of Sn, lying about 2.65 mm distally, midway between N and Pt. IR1 long, originating two cells distal of base of RP2 and three cells basal of Pt base. RP1 with a very slight angle below Pt brace. Longitudinal veins RA, RP1, IR1, RP2 and IR2 converging on wing apex. MA distally zigzagged and long, reaching posterior wing margin two cells basad base of Pt-brace. MP curved, three cells long, ending on posterior wing margin opposite first crossvein between RP3/4 and IR2. Pt brown, covering one cell, 0.43 mm long and 0.31 mm wide (measured medially), thickened and fused with greatly thickened pterostigmal part of RA as a U-shaped structure.

Hind wing about 10.8 mm long, about 2.15 mm wide, with nearly the same venation as in forewing, except for the presence of seven postnodal and six postsubnodal crossveins basad pterostigma, and MP ending on posterior wing margin one cell distad level of first crossvein between RP3/4 and IR2.

Abdomen complete, about 14.7 mm long, and about 0.65 mm wide (at maximum), dark brown. Ovipositor not protruding apex of abdomen (female).

Discussion

The new fossil exhibits all the diagnostic characters of the Mesostictinae, a Cretaceous subfamily of Platystictidae, listed in Zheng *et al*. (2019: 3): 'Base of RP3/4 just basal of Sn; base of RP2 three or four cells distal of Sn; MA long and ending on posterior wing margin just below Pt brace; MP three or four cells long; CuP in basal position [putative synapomorphy with the Platystictidae, see Huang *et al*., 2015]; crossvein present basally closing subdiscoidal cell, separate from CuP [putative synapomorphy with the Platystictidae, see Huang *et al*., 2015]; subdiscoidal cell posteriorly closed by AA and not by posterior wing margin; RP1 with slight angle below pterostigmal brace; few postnodal and postsubnodal crossveins (fewer than 10), somewhat aligned; nodus not in very basal position, at least at 35% of wing length; longitudinal veins RA, RP1,

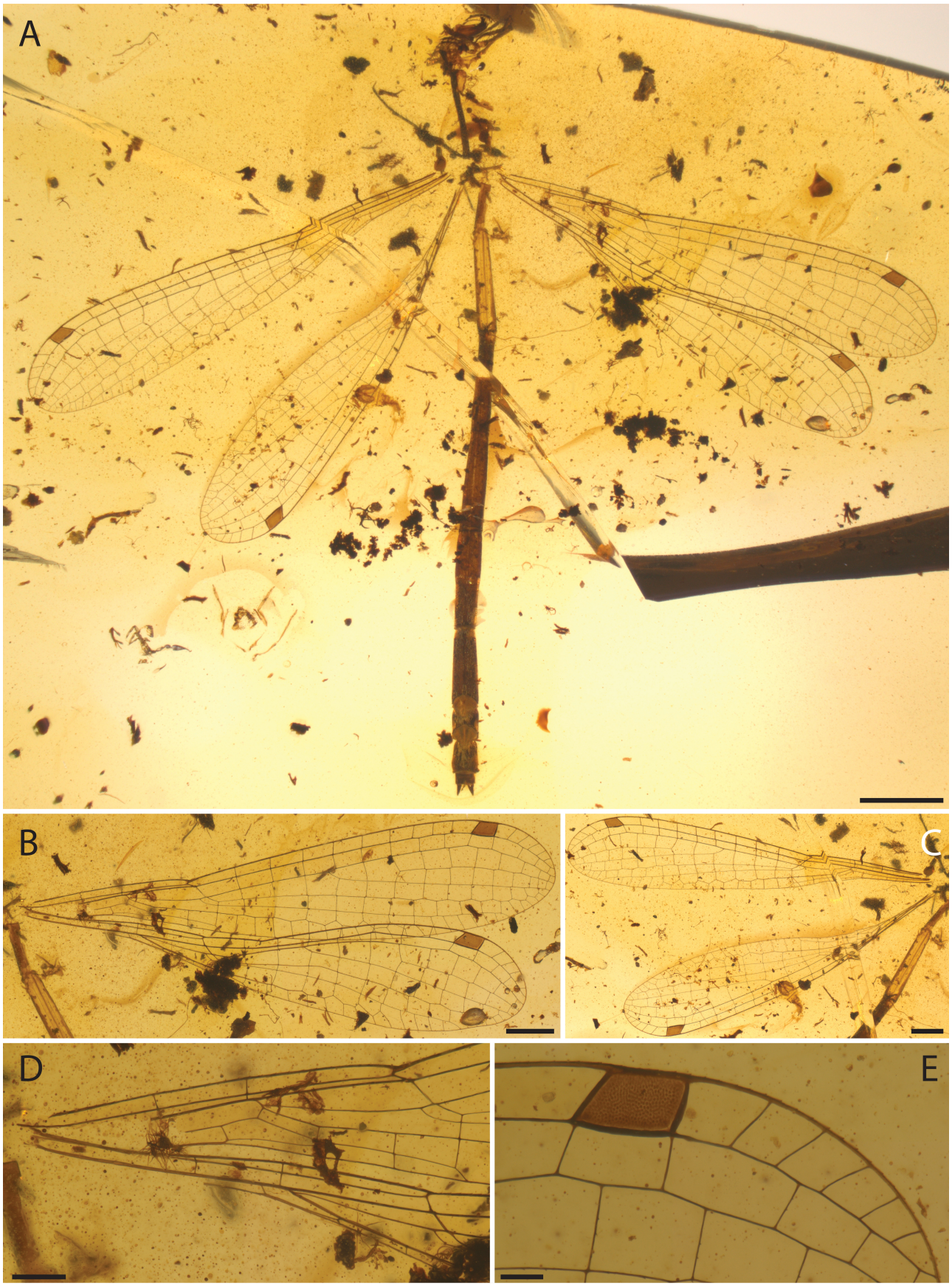

FIGURE 1. *Mesosticta additicta* **sp. nov.**, holotype NIGP204970. **A**, Habitus in dorsal view. **B**, Right wings. **C**, Left wings. **D**, Detailed view of bases of right wings. **E**, Detailed view of pterostigma. Scale bars = 2 mm (**A**), 1 mm (**B**, **C**), 0.5 mm (**D**), 0.2 mm (**E**).

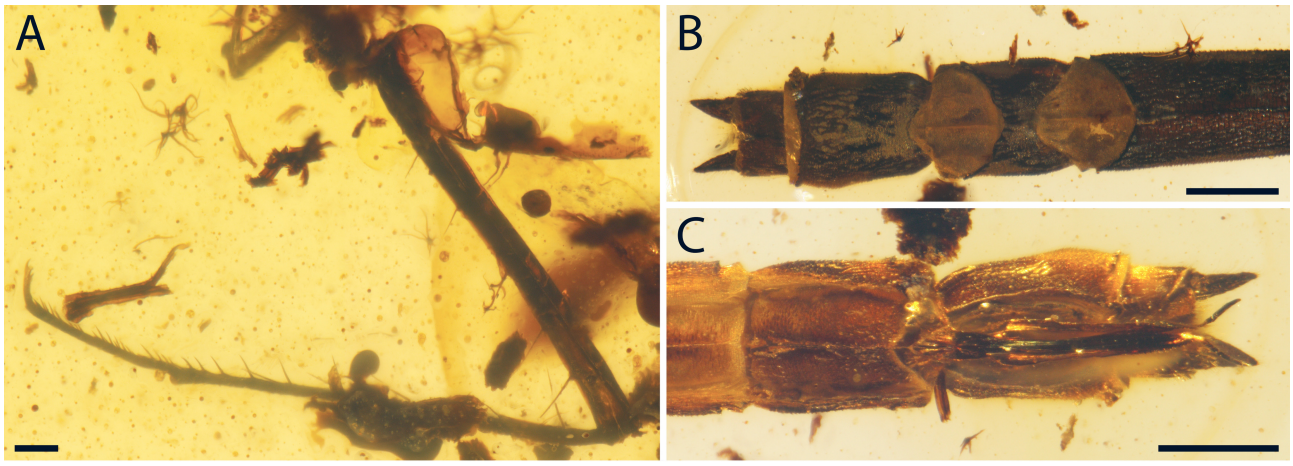

FIGURE 2. *Mesosticta additicta* **sp. nov.**, holotype NIGP204970. **A**, Detailed view of hind leg. **B**, Dorsal view of abdomen apex. **C**, Ventral view of abdomen apex. Scale bars = 0.2 mm (**A**), 0.5 mm (**B**, **C**).

IR1, RP2 and IR2 strongly converging on wing apex; Pt one cell long, thickened and fused with greatly thickened pterostigmal part of RA as U-shaped structure'.

The Mesostictinae encompasses only one genus: *Mesosticta*. The new fossil differs from *M. burmatica* and *M. electronica* in the forewing vein MP, which is considerably shorter, ending at the level of the first crossvein between IR2 and RP2 as opposed to one cell distally, and the apex of MAa terminating two cells basad of the level of the pterostigma, in contrast to reaching its level (Huang *et al*., 2015; Zheng *et al*., 2016). In *M. davidattenboroughi*, the apex of forewing MP is positioned at a level of the second cell located distad the first crossvein between IR2 and RP2 (*vs*. well-before in the new species), and the apex of MAa reaches the level of the pterostigma (*vs.* ends slightly after the origin of IR1) (Zheng *et al*., 2019).

The genus *Mesosticta* is exclusively documented in mid-Cretaceous Kachin amber, suggesting its endemicity to the WBB. This proposition aligns with prior research emphasising the geographic isolation of the WBB during the formation of mid-Cretaceous Kachin amber (Westerweel *et al*., 2019; Jouault, 2021).

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References

Bechly, G. (1996) Morphologische Untersuchungen am Flügelgeäder der rezenten Libellen und deren Stammgruppenvertreter (Insecta; Pterygota; Odonata), unter besonderer Berücksichtigung der Phylogenetischen Systematik und des Grundplanes der Odonata. *Petalura*, 2, 1–402.

Dijkstra, K.-D.B., Kalkman, V.J., Dow, R.A., Stokvis, F.R. & van Tol, J. (2014) Redefining the damselfly families: a comprehensive molecular phylogeny of Zygoptera (Odonata). *Systematic Entomology*, 39, 68–96. https://doi.org/10.1111/syen.12035

Huang, D.Y., Azar, D., Cai, C.Y. & Nel, A. (2015) New damselfly genera in the Cretaceous Burmese amber attributable to the Platystictidae and Platycnemididae Disparoneurinae (Odonata: Zygoptera). *Cretaceous Research*, 56, 237–243. https://doi.org/10.1016/j.cretres.2015.05.004

Jouault, C. (2021) Mid-Cretaceous Burmese amber pelecinid wasps (Hymenoptera, Pelecinidae) support the hypothesis of an Asian origin of the family. *Annales de Paléontologie*, 107, 102464. https://doi.org/10.1016/j.annpal.2020.102464

Nel, A., Martínez-Delclòs, X., Paicheler, J.C. & Henrotay, M. (1993) Les 'Anisozygoptera' fossiles. Phylogénie et classification (Odonata). *Martinia Hors Série*, 3, 1–311.

Riek, E.F. (1976) A new collection of insects from the Upper Triassic of South Africa. *Annals of the Natal Museum*, 22, 791–820.

Riek, E.F. & Kukalová-Peck, J. (1984) A new interpretation of dragonfly wing venation based upon Early Carboniferous fossils from Argentina (Insecta: Odonatoidea) and basic character states in pterygote wings. *Canadian Journal of Zoology*, 62, 1150–1166. https://doi.org/10.1139/z84-166

Selys-Longchamps, E. de (1854) Monographie des Calopterygines. *Mémoires de la Société royale des Sciences de Liège*, 9, xi, 291 pp.

Westerweel, J., Roperch, P., Licht, A., Dupont-Nivet, G., Win, Z., Poblete, F., Ruffet, G., Swe H.H., Kai Thi M. & Wa Aung, D. (2019) Burma Terrane part of the Trans-Tethyan arc during collision with India according to palaeomagnetic data. *Nature Geoscience*, 12, 863–868. https://doi.org/10.1038/s41561-019-0443-2

Zheng, D.R. (2021) Odonatans in lowermost Cenomanian Kachin amber: updated review and a new hemiphlebiid damselfly. *Cretaceous Research*, 118, 104640. https://doi.org/10.1016/j.cretres.2020.104640

Zheng, D.R., Wang, B., Nel, A., Jarzembowski, E.A., Zhang, H.C. & Chang S.C. (2019) Mesostictinae subfam. nov., an archaic group of platystictid damselflies (Odonata: Zygoptera) from mid-Cretaceous Burmese amber. *Journal of Systematic Palaeontology*, 17, 1–8. https://doi.org/10.1080/14772019.2017.1348395

Zheng, D.R., Zhang, Q.Q., Chang, S.C. & Wang, B. (2016) A new damselfly (Odonata: Zygoptera: Platystictidae) from mid-Cretaceous Burmese amber. *Cretaceous Research*, 63, 142–147. https://doi.org/10.1016/j.cretres.2016.03.006