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New unique characters of the mid-Cretaceous genus *Punctocorydasialis* Chen *et al.*, 2026 (Neuropterida: Corydasialidae)

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Abstract

The mid-Cretaceous Kachin amber genus *Punctocorydasialis* Chen *et al.*, 2026 is remarkable in many aspects. It is distinguished from others in the family by its spotted forewings (as noted by Chen *et al.*, 2026), short hind wings (0.75 of forewing length) with a simple CuP, and the terminal segment of its presumed labial palps bears an additional minute sub-segment. Its mesonotum has an additional subdivision, *i.e.*, a well-separated middle part, previously not recorded in Neuropterida. An area of modified microtrichia which may have a stridulatory function in the anal space of the forewing found in this species is previously unknown in fossil Neuropterida.

Keywords: Neuropterida, Corydasialidae, Kachin amber, labial palps, mesonotum

Introduction

The systematic position of the enigmatic extinct family Corydasialidae is unclear. It is considered to belong to either Megaloptera (*e.g.*, Wichard *et al.*, 2005; Jepson *et al.*, 2012) or Neuroptera (*e.g.*, Liu *et al.*, 2017; Engel *et al.*, 2018; Lu & Liu, 2021; Chen *et al.*, 2026), but this is not discussed here. The family includes seven genera and 11 species from the Early Cretaceous (late Aptian) Crato Formation (Brazil); mid-Cretaceous Kachin amber of Myanmar; the early Eocene McAbee locality (British Columbia, Canada); and the late Eocene Baltic amber (Martins-Neto, 1994, 1997; Nel *et al.*, 2005; Wichard *et al.*, 2005; Archibald & Makarkin, 2015; Liu *et al.*, 2017; Chen *et al.*, 2023, 2026).

The recently described *Punctocorydasialis zhiqiae* Chen *et al.*, 2026 from mid-Cretaceous Kachin amber based on two specimens is remarkable for its spotted forewings. Other significant features were not, however, mentioned in the original description. Here, a third specimen of the species is described and these features are reported.

Material and methods

The amber piece comes from Kachin amber in northern Myanmar, estimated to be earliest Cenomanian (Shi *et al.*, 2012; Smith & Ross, 2018) from the Hukawng Valley, the state of Kachin (see map in Makarkin & Staniczek, 2026: fig. 1).

Photographs were taken by Carsten Gröhn using a Zeiss stereomicroscope (modified with variable objectives: Nikon M Plan 5×, 10×, 20×, 40×; Luminar 18 mm, 25 mm, 40 mm) and an attached Canon EOS 450D digital camera. Line drawings were prepared by the author using Adobe Photoshop CS3.

Venational terminology follows Breitkreuz *et al.* (2017).

Abbreviations: A1–A4, first to fourth anal veins; cf, claval flexion fold/line; CuA, anterior cubitus; CuP, posterior cubitus; MA, anterior media; MP, posterior media; RA, anterior radius; RP, posterior radius; RP1, proximal-most branch of RP; Sc, subcosta; ScA, subcostal bulge.

Systematic palaeontology

Superorder Neuropterida (Neuropteroidea) *sensu* Handlirsch, 1903
Order uncertain
Family Corydasialidae Wichard *et al.*, 2005

***Punctocorydasialis zhiqiae* Chen *et al.*, 2026**
(Figs 1–7)

Material. Specimen GPIH 4987 (CCGG 20510), an

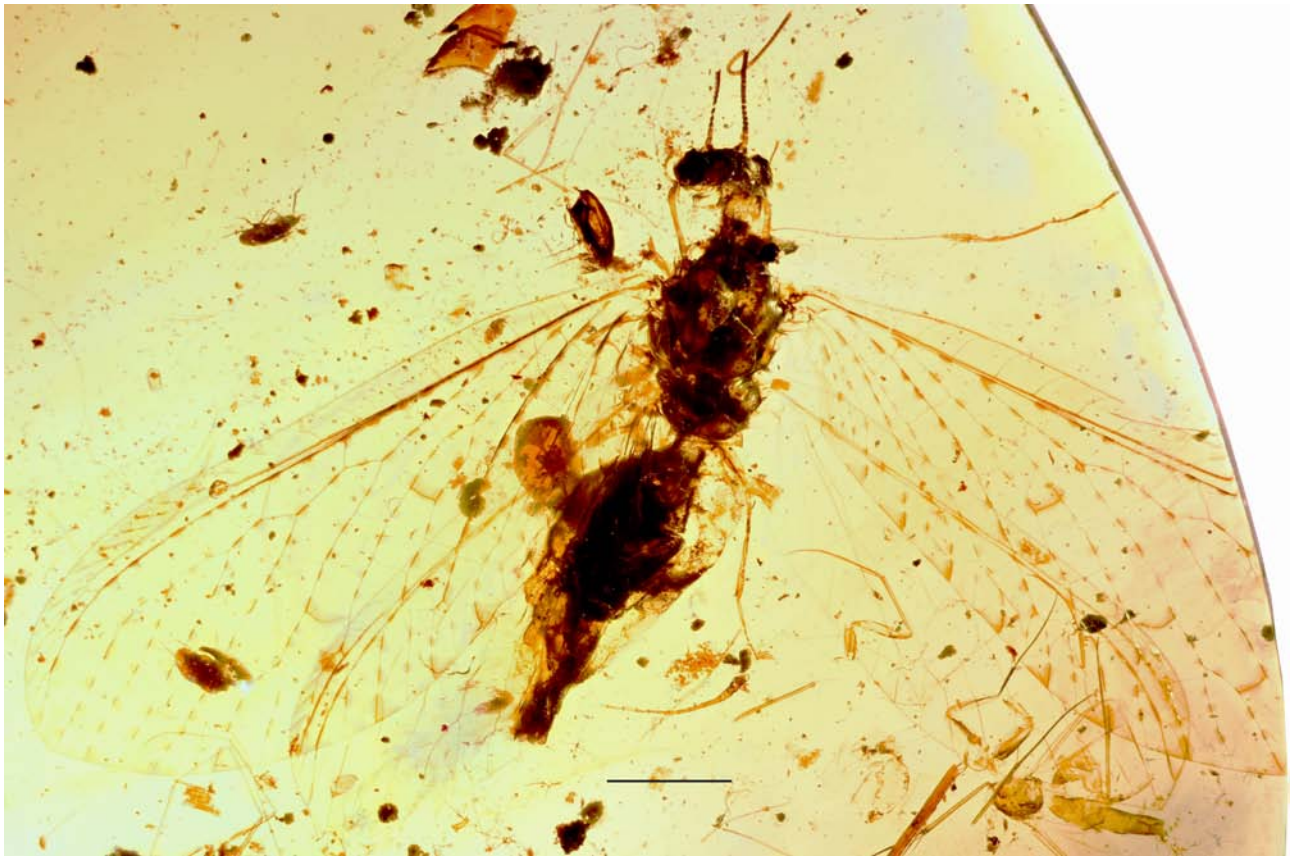

FIGURE 1. *Punctocorydasialis zhiqiae* Chen *et al*., 2026, specimen GPIH 4987 as preserved (dorsal view). Scale bar = 2 mm.

almost complete specimen deposited in the Geological-Paleontological Museum of Nature Hamburg (Das Museum der Natur Hamburg—Geologie-Paläontologie) in the Leibniz Institute for the Analysis of Biodiversity Change (Leibniz-Institut zur Analyse des Biodiversitätswandels), Hamburg, Germany. The Carsten Gröhn collection is deposited separately in the museum with the abbreviation CCGG. Kachin amber (Tanai Township, Myitkyina District, Hukawng Valley, Kachin State, Northern Myanmar). Late Cretaceous: earliest Cenomanian.

Description. *Head*. Orthognathous, with scarce and extremely short setae; transverse in dorsal view (Fig. 2A). Eyes relatively large. Clypeus large, with distinct, longitudinal median suture. Antennae covered with very short, rather dense setae; scapus short, broad basally; pedicellus elongate, slightly larger than first flagellomere, which is also elongate; other flagellomeres slightly longer than wide. Presumed maxillary palps slender, elongate (details indiscernible). Presumed labial palps probably three-segmented; terminal segment strongly enlarged, with minute additional semi-segment (Fig. 2B).

Prothorax. Slightly elongate; setae on pronotum not discernible (absent or extremely short and scarce); appears homogeneous ventrally; two pairs of cervical sclerites (anterior lateral and posterior lateral) not detected, probably absent (Fig. 2A).

Mesothorax. Covered only with very scarce and extremely short setae; two halves of anterior part of mesoscutum touch only at front and diverge at back forming middle part of mesoscutum (Fig. 2C); fairly deep depression in posterior part of mesoscutum divides it into anterior and posterior halves; mesoscutellum very large, five-sided.

Metathorax. Metascutum and metascutellum well developed.

Forelegs. Tibia elongate, covered with dense, short setae; apical spurs not detected. Tarsus: first protarsomere (probasitarsus) longer than three following tarsomeres together, covered with dense, short setae; 2nd to 4th protarsomeres similarly constructed, short, covered with dense, short setae and two latero-apical larger setae; 5th protarsomere elongate, slightly dilated distad (at least, 3rd to 5th protarsomeres slightly bilobed); claws slender, curved at apex; presumed emporium (or arolium?) small, pad-like (Fig. 3A, B).

Mid-legs. Incompletely preserved.

Hind legs. Femur expanded, probably damaged (*i.e*., setae not detected); tibia long, slender, covered with rather short, dense setae with probably two apical spurs. Tarsus: first tarsomere (metabasitarsus) very long, slightly longer than three following tarsomeres together, covered with dense, short fine setae and about 10 strong setae in distal

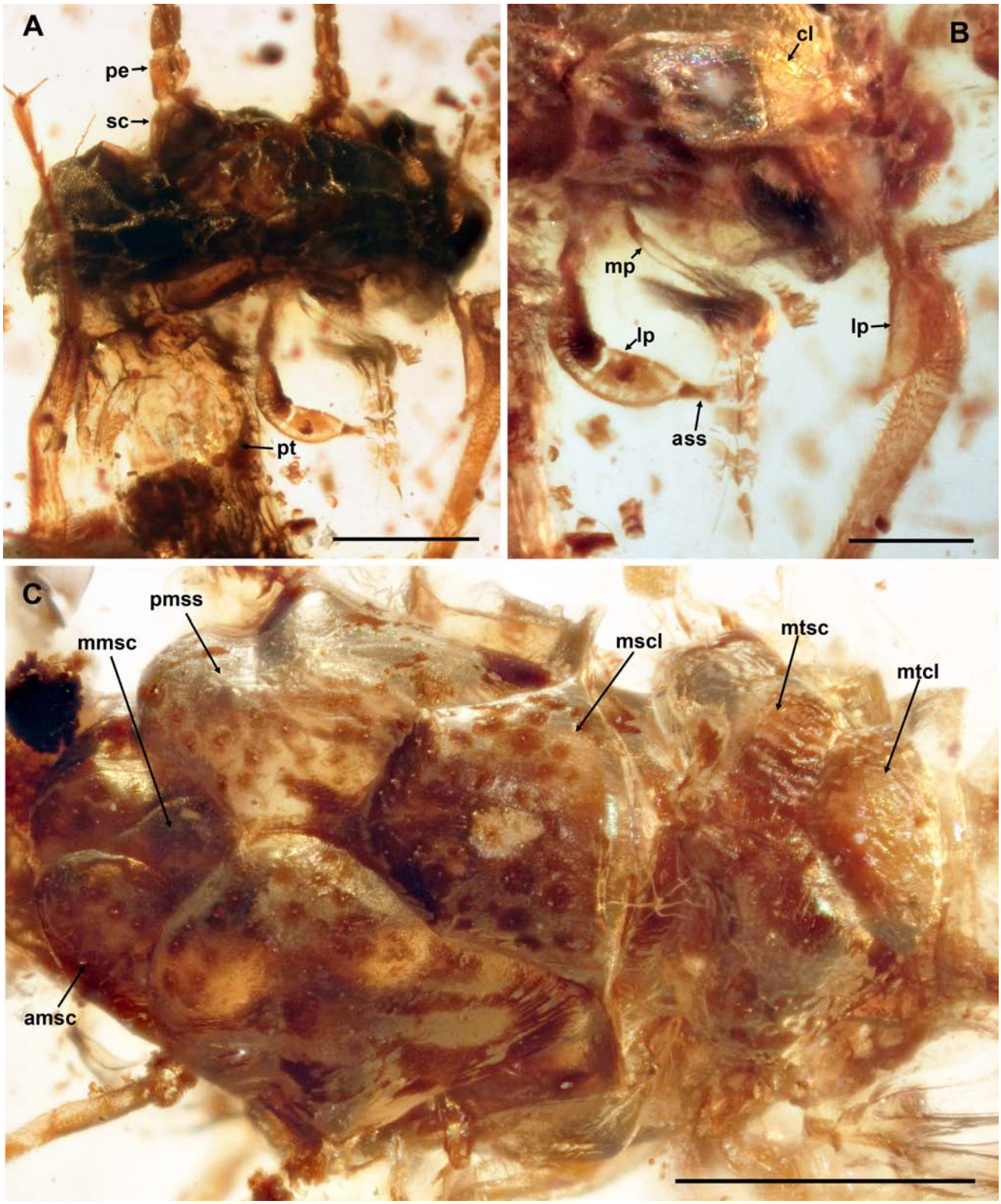

FIGURE 2. Head and thorax of *Punctocorydasialis zhiqiae* Chen *et al*., 2026, specimen GPIH 4987. **A**, Head and prothorax, ventral view. **B**, Head in detail, ventral view. **C**, Thorax, dorsal view. amsc, anterior part of mesoscutum; ass, additional subsegment; cl, clypeus; lp, labial palpus; mmsc, middle part of mesoscutum; mp, maxillary palpus; mscl, mesoscutellum; mtsc, metascutum; mtcl, metascutellum; pe, pedicellus; pmss, posterior part of mesoscutum; pt, prothorax; sc, scapus. Scale bars = 0.5 mm (**A**); 0.25 mm (**B**), 1 mm (**C**).

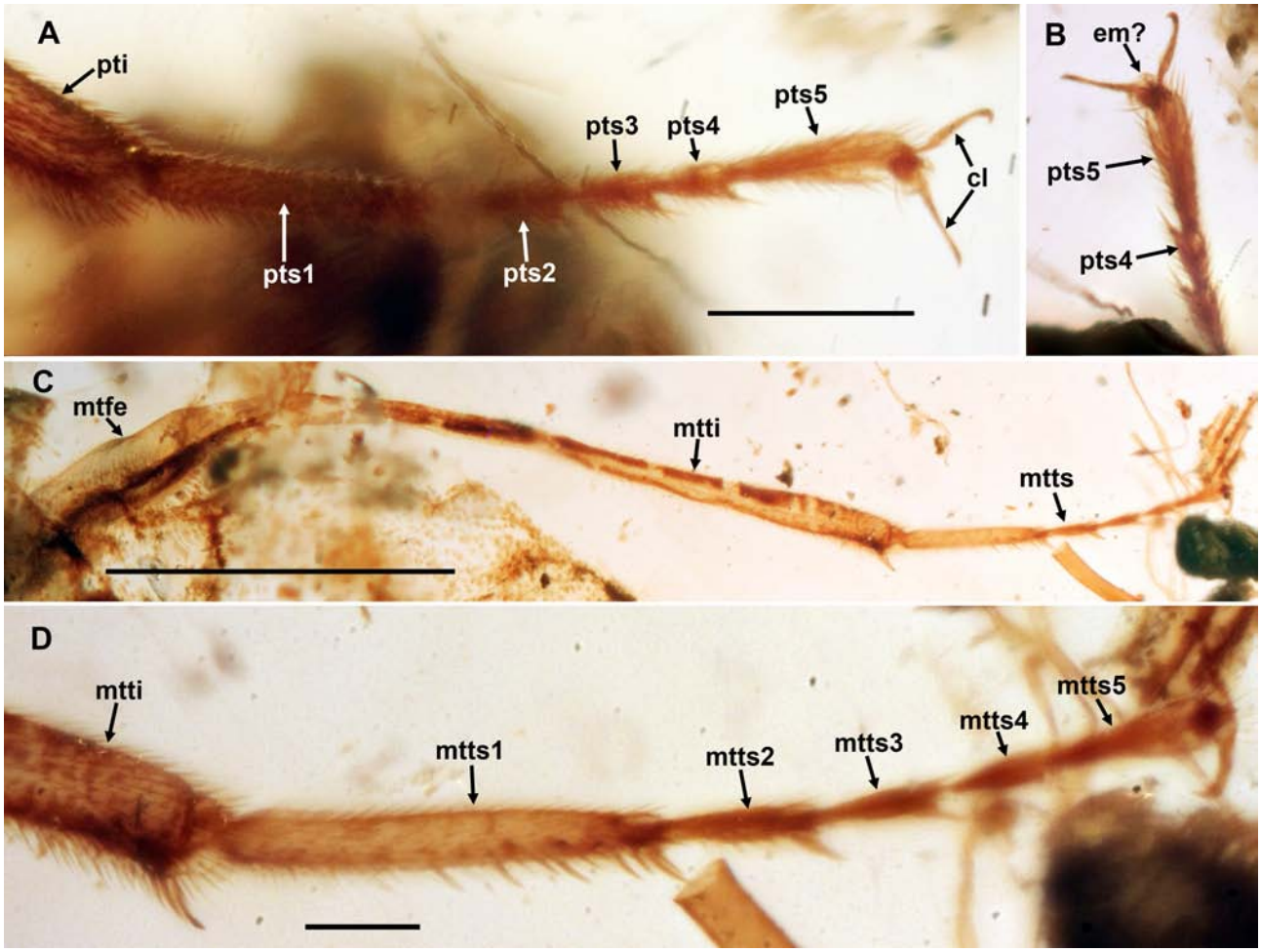

FIGURE 3. Legs of *Punctocorydasialis zhiqiae* Chen *et al*., 2026, specimen GPIH 4987. **A**, Tarsus of left foreleg, dorsal view. **B**, Terminal part of the tarsus of left forelegs, ventral view. **C**, Right hind leg, dorsal view. **D**, Tarsus of right hind leg, dorsal view. cl, claws; em, empodium; mtfe, metafemur; mtti, metatibia; mtts, metatarsus; mtts1–mtts5, first metatarsomere to fifth metatarsomere; pti, protibia; pts1–pts5, first protarsomere to fifth protarsomere. Scale bars = 0.25 mm (**A**, **B**), 1 mm (**C**), 0.1 mm (**D**).

half of ventral edge; 2nd to 5th protarsomeres similar to that of foreleg, but somewhat longer (Fig. 3C, D).

Forewing. 12.3 mm long, 4.8 mm wide (Fig. 4). Costal space moderately broad, narrowed proximad. ScA bulge appears as longitudinal vein-like structure; its connecting with Sc poorly discernible (at least not obvious). All subcostal veinlets (including humeral) simple; proximal veinlets rather closely spaced; medial ones widely spaced becoming more closely spaced and oblique distad; basal parts in veinlets of pterostigmal region undiscernible. Pterostigma well developed, long. Subcostal space dilated toward apex, with one distal short crossvein. Sc appears thickest in pterostigmal region, ending at margin well before wing apex. Posterior trace of RA smoothly curved posteriorly, ending at margin before wing apex; with three anteriorly-directed sigmoid branches (first branch forked, other simple) and one crossvein between these. RA space moderately broad, slightly dilated toward apex, with five preserved crossveins. RP originates far from wing base (at 0.25 of complete length), zigzagged, with four pectinate branches. RP1 rather deeply forked; RP2 rather shallowly forked; stem of RP, RP3, RP4 simple. Seven crossveins in RP space: three between RP1, RP2; two between RP2, RP3; one each between RP3, RP4 and RP4, stem of RP. Between RP, MA four crossveins. M forked distad origin of RP; both MA, MP forked once. Between MA, MP three crossveins. Between M/MP and CuA five crossveins: two connect M and CuA; two connect MA and CuA; one connects posterior branch of MA fork and anterior branch of CuA fork. Cu dividing into CuA, CuP near wing base. Both CuA, CuP forked once, between them four crossveins. Between CuP and A1 distinct claval flexion line/fold, and three crossveins (basal-most is shortest). A1 pectinately forked, with three simple branches. A2 deeply forked once. Between A1 and A2 two crossveins. A3, A4 long, simple. Between A1, A2 and A2, A3 two crossveins each. Setae very short, rather dense on costal margin (Fig. 6A) and in one row on hind margin (Fig. 6B). Setae on veins

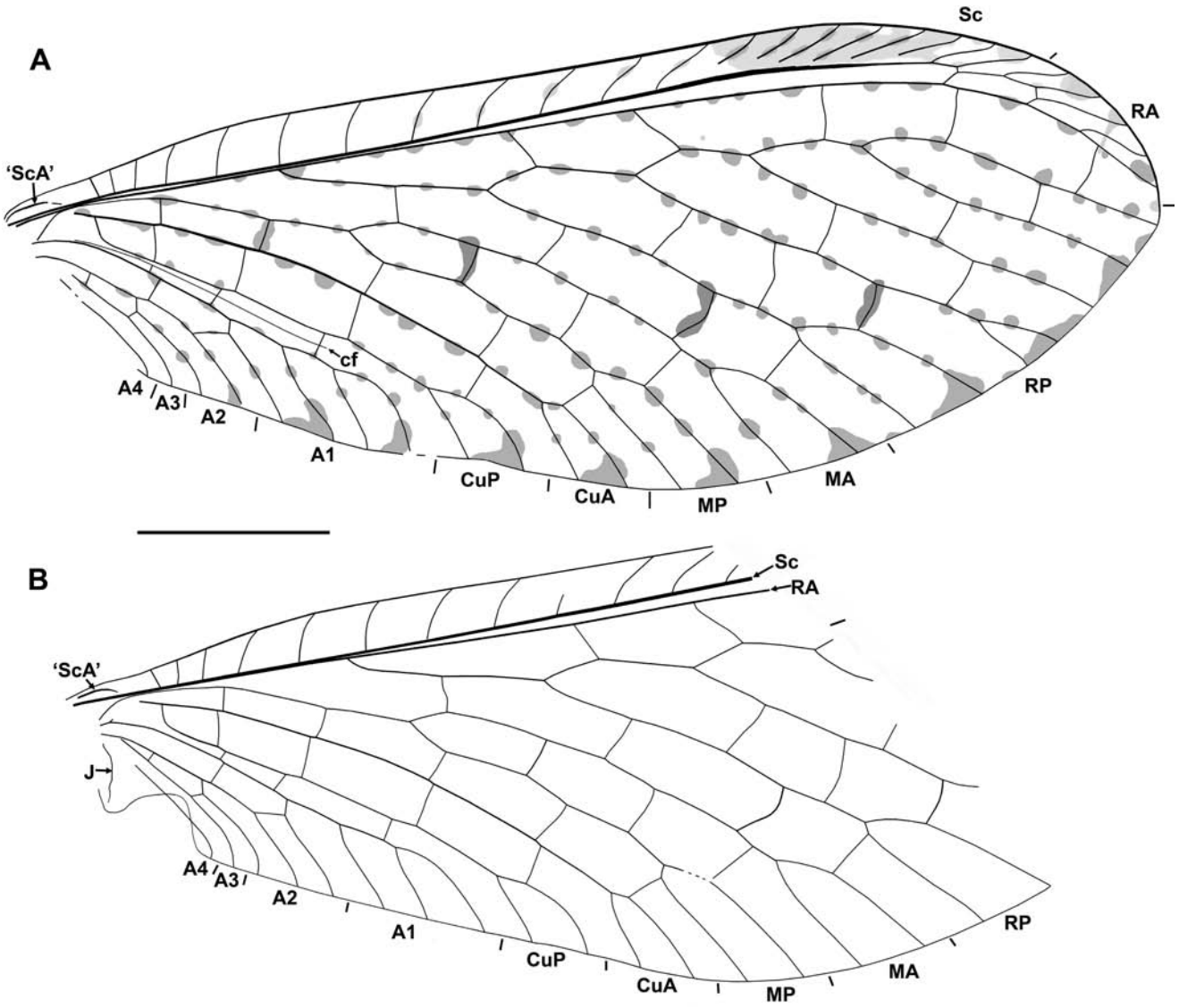

FIGURE 4. Forewing venation of *Punctocorydasialis zhiqiae* Chen *et al*., 2026, specimen GPIH 4987. **A**, Left wing (converted to standard right view). **B**, Right wing (maculation omitted). Scale bar = 2 mm (both to same scale).

extremely short and very scarce, except pterostigmal area where these are rather dense on Sc and subcostal veinlets. Clearly visible microtrichia occupy relatively large area in anal space of right wing (between distal parts A3 and A4, and proximad A4) (Fig. 6D). Color pattern: numerous small brownish spots around longitudinal veins; several bigger spots along outer and hind margins; membrane surrounding three crossveins (between MA, MP; RP1, MA; and RP1, PR2) brown; pterostigmal region almost entirely brownish.

Hind wing. 9.2 mm long, 3.4 mm wide (Fig. 5). Costal space moderately broad; in proximal half broader than that of forewing. Humeral plate not detected. Subcostal veinlets simple, oblique, widely spaced. Pterostigma rather well developed, long. Subcostal space dilated toward apex; one distal very poorly preserved crossvein detected in left wing (connecting Sc and distal branch of RA). Sc smoothly curved posteriorly in distal part, ending at margin well before wing apex. Posterior trace of RA smoothly curved posteriorly, ending at margin before wing apex; with one anteriorly-directed branch. RA space rather broad, with three crossveins. RP originates far from wing base (at 0.22 of complete length), strongly zigzagged, with three pectinate branches. RP1 forked once; stem of RP and other branches simple. Three crossveins in RP space: two between RP1, RP2; one between RP2, RP3. Three crossveins between RP and MA: basal crossvein 1r-m not detected (probably lost); 2r-m connects stem of RP, MA; other two crossveins connect RP1, MA. M forked approximately at level of origin of RP; MA simple; MP forked once. Three crossveins between MA, MP. Cu dividing into CuA, CuP near wing base; CuA pectinate, with two simple branches; CuP simple. Cubital space relatively narrow, with two crossveins. A1, A2 forked

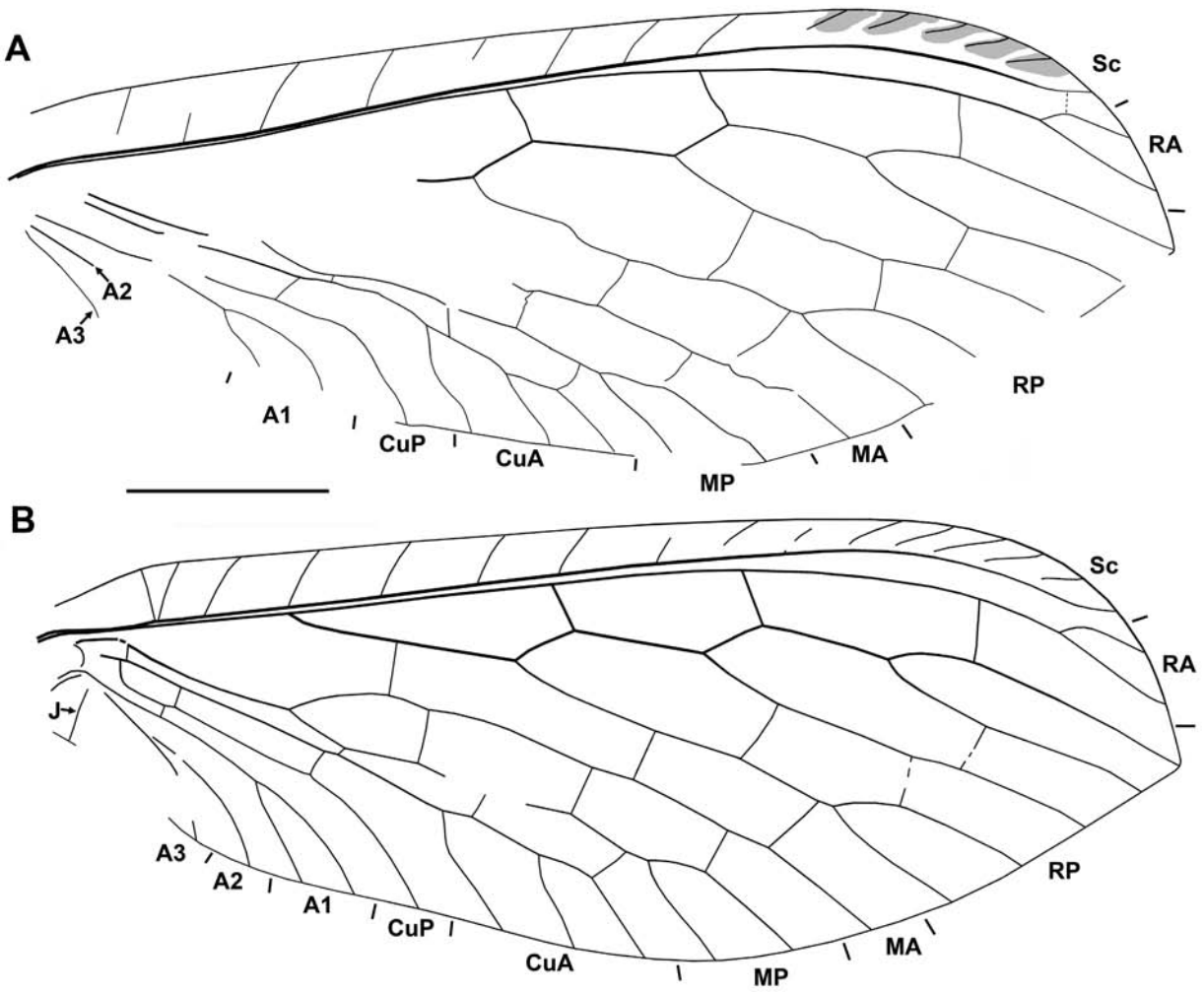

FIGURE 5. Hind wing venation of *Punctocorydasialis zhiqiae* Chen *et al*., 2026, specimen GPIH 4987. **A**, Left wing (converted to standard right view). **B**, Right wing (maculation omitted). Scale bar = 2 mm (both to same scale).

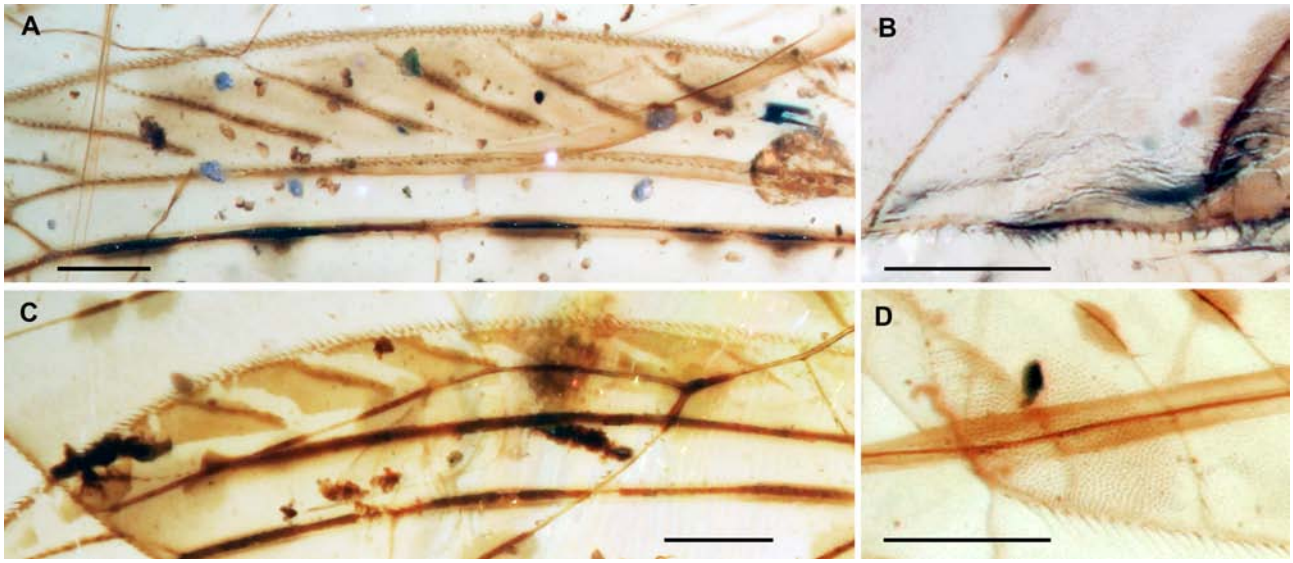

FIGURE 6. Wing setation of *Punctocorydasialis zhiqiae* Chen *et al*., 2026, specimen GPIH 4987. **A**, Pterostigmal area of the left forewing. **B**, Hind margin of the left forewing. **C**, Pterostigmal area of the left hind wing. **D**, Modified microtrichia in the anal space of the right forewing. Scale bars = 0.3 mm.

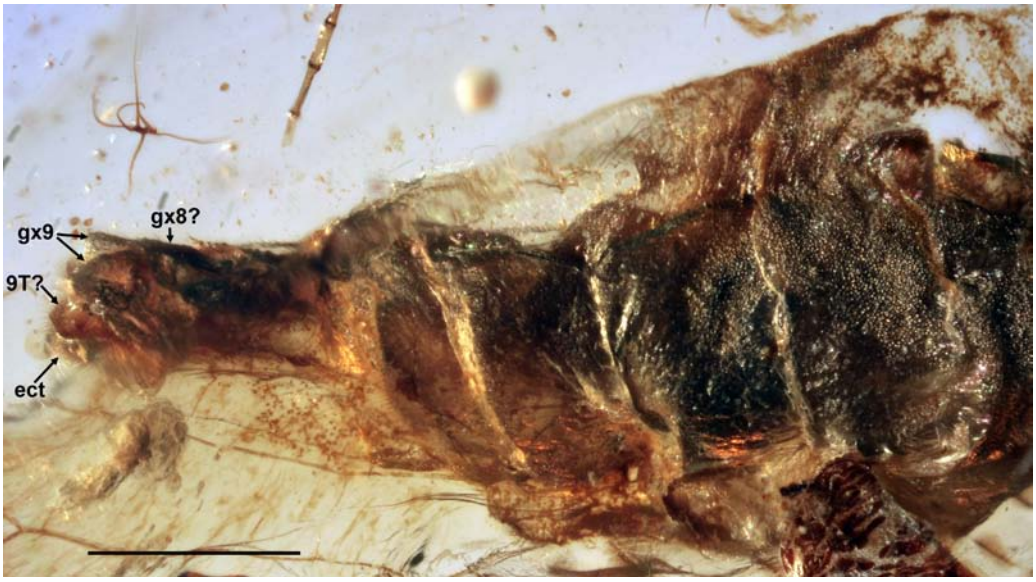

FIGURE 7. Female abdomen of *Punctocorydasialis zhiqiae* Chen *et al*., 2026, specimen GPIH 4987 (ventral view). ect, ectoproct; gx9, gonocoxites 9; gx8, gonocoxites 8; 9T, 9th tergite. Scale bar = 1 mm.

once each. A3 simple. A4 not detected. Setae similar to those of forewing. Color pattern: pterostigmal region with several brownish spots (Fig. 6C).

Female abdomen broad, narrow apically. Presumed gonocoxites 8 fused, forming elongate sclerite; gonocoxites 9 rather large, semi-oval; presumed 9th tergite extended caudally; ectoproct rather small, its shape unclear (Fig. 7).

Discussion

Punctocorydasialis zhiqiae is remarkable in many aspects, *e.g*., it is the only known species in this family to have spotted forewings (see Chen *et al*., 2026). It also has a number of unique features not detected in other members of the family or even in other Neuropterida.

First, the mesonotum of specimen GPIH 4987 has an additional subdivision, *i.e*., a well-separated middle part (Fig. 2C). This is clearly discernible in the holotype as well (see Chen *et al*., 2026: fig. 1B). As far as I know, this has not been previously recorded in Neuropterida. Their mesoscutum is divided into two parts: anterior, which is often divided by a median suture into two halves (it is called sometimes the 'prescutum': *e.g*., Killington, 1936), and posterior (two large lateral lobes with a median constriction) (see discussion in Makarkin & Perkovsky, 2020).

The presumed labial palps are unique in this species. Their apical segment is very enlarged and bears a minute apical non-pointed sub-segment (Fig. 2B, labelled as 'ass'). However, because of the orientation of the head, it is difficult to determine with certainty whether palps are labial or mandibular. In other Corydasialidae, the terminal segment of the labial palps is sometimes more enlarged than that of the mandibular palps (*e.g*., Chen *et al*., 2023: fig. 10), but the labial palps lack such a sub-segment. The presence of the additional sub-segment is also characteristic of some Hemerobiidae, but it is pointed in these (see Makarkin, 2022).

Its simple hind wing CuP distinguishes *Punctocorydasialis* Chen *et al*., 2026 from other genera of the family. Of the three known specimens of the genus and species, only one hind wing has a forked CuP while it is simple in the other hind wing of the same specimen (see Chen *et al*., 2026: fig. 3C).

The species has relatively short hind wings (0.75 of forewing length in two specimens, 0.82 in one), while this ratio is 0.83–0.93 in other Kachin genera (based on data of Liu *et al*., 2017 and Chen *et al*., 2023, 2026).

Finally, in this species, an area of modified microtrichia is found in the anal space of the forewing (Fig. 6D). A similar area of modified microtrichia is present in most taxa of the extant Neuropterida and may have a stridulatory function (Riek, 1967). However, this structure had not previously been detected in fossil Neuropterida.

Punctocorydasialis resembles many other Corydasialidae in other features, differing from these only in details. In particular, bilobation of the fourth tarsomere is weakly developed in *Punctocorydasialis* (Fig. 3B, D). Relatively similar states are found in *Paracratochrysa* Chen *et al*., 2023, *Megalopteroneura* Liu *et al*., 2017, and *Cratochrysa* Martins-Neto, 1994 (Liu *et al*., 2017:

fig. 3; Chen *et al*., 2023: fig. 1E; pers. obs.), whereas this tarsomere is strongly bilobed in *Simplicorydasialis* Chen *et al*., 2023 and *Corydasialis* Wichard *et al*., 2005 (Wichard *et al*., 2005: figs 5, 6; Chen *et al*., 2023: fig. 12C).

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