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Burmapsyche wolframmeyi sp. nov., a new species of the extinct family Burmapsyichidae (Insecta, Trichoptera) embedded in mid-Cretaceous Burmese Amber

WILFRIED WICHARD & RYOICHI B. KURANISHI

Abstract

A third species *Burmapsyche wolframmeyi* sp. nov. from the extinct family Burmapsyichidae found in Burmese amber is described based on a male specimen. *Burmapsyche wolframmeyi* sp. nov. is distinguished from the two previously described *Burmapsyche* species, *B. comosa* and *B. palpifurcata*, by the presence of baso-laterally attached scale-like process of the pedicellus that is about as long as the pedicellus, and by the differently shaped inferior appendages each consisting of a broad and upright coxopodite and a finger-shaped harpago, both with same length.

Key words: Fossil caddisflies, Sericostomatoidea, *Cretapsyche*, *Cretahelicopsyche*.

1. Introduction

In the mid-Cretaceous Burmese Amber, 47 extinct caddisfly (Trichoptera) species have been described to date, distributed among 17 genera and 11 families (Ross 2022). Of the 17 genera, five are extant genera that are still present 100 mill years later. 12 genera, however, are extinct, so far only found in Burmese amber, and contributing to the trichopteran biota in the mid-Cretaceous. Among the 11 families recorded, only three of them, Burmapsyichidae, Cretapsychidae and Palaeoptocidae, are recorded exclusively from Burmese amber.

The family Burmapsyichidae belongs to the integripalpian superfamily Sericostomatoidea and can be distinguished from all extant and extinct families of the Trichoptera by the following combination of characters: adults without ocelli; antennae at least as long as forewings, often with modified flagellomeres; scape longer than the head, usually surrounded by brushes of long setae; maxillary palps 3-segmented based on strong apical stipes and a basal cardo; labial palps 3-segmented; terminal palpomeres of maxillary and labial palps not annulated and not flexible; forewing venation with apical forks II, III, and V, but apical forks I and IV absent, discoidal cell absent, and Cu2 ending on Culb or connected to Culb by a crossvein; hind wing venation with apical forks I, III, and V, discoidal cell absent, thyridial cell closed and long or absent; tibial spur formula 2/2/4.

Two species are described: *Burmapsyche comosa* WICHARD, NEUMANN, MÜLLER, & WANG, 2018, and *B. palpifurcata* WICHARD, NEUMANN, MÜLLER, & WANG, 2018. A third species *Burmapsyche wolframmeyi* sp. nov., is described in this paper.

2. Material and methods

The amber material was collected by local people in the Hukawng valley of northern Myanmar (Myitkyina District of Kachin State) and dates from the middle Cretaceous (Cenomanian) period about 98.8 ± 0.6 Ma ago (SHI et al. 2012). The Burmese amber with the embedded Trichoptera inclusion was cut, face-grinded, and polished. Colour pictures and drawings were produced for the documentation of the specimen. The microscope Leica M420 with Apozoom 1:6 was used in combination with a Canon EOS 80D, EOS 3.0 utility software, and the Zerene Stacker software. Measurements were made with the ocular micrometer of the Leica SApo microscope.

Abbreviations: The wing venation terminology: I = apical fork I, II = apical fork II, III = apical fork III, IV = apical fork IV, V = apical fork V, r-m = crossvein r-m, Sc = subcostal, R = radius, M = media, Cu1 = cubitus anterior, Cu2 = cubitus posterior, A = anal vein, TC = thyridial cell.

The head and male genitalia: scaly ap = scaly appendage, lab = labial palp, max = maxillary palp, cox = coxopodite, har = harpago, inf ap = inferior appendage, X ap = mesodorsal lobe of tergum X.



Fig. 1. *Burmapsysche wolframmeyi* sp. nov. embedded in mid-Cretaceous Burmese amber, holotype, deposited in Systematic Entomology Collection of Hokkaido University Museum, Japan, SEHU: 54024.

3. Systematic palaeontology

Order Trichoptera KIRBY, 1813

Suborder Integripalpia MARTYNOV, 1924

Infraorder Brevitentoria WEAVER, 1984

Superfamily Sericostomatoidea STEPHENS, 1836

Family Burmapsychidae WICHARD, 2021

Burmapsyche wolframmei sp. nov.

Figs. 1–3

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E t y m o l o g y : The new fossil *Burmapsyche* is named for Dr. WOLFRAM MEY on the occasion of his 70th birthday. WOLFRAM MEY is a well-known expert on recent and fossil Lepidoptera and Trichoptera and co-discoverer of the fossil order Tarachoptera.

H o l o t y p e (Fig. 1): Type-specimen deposited in the Systematic Entomology Collection of Hokkaido University Museum, Japan, inventory number: SEHU 54024 (ex coll. RYOICHI B. KURANISHI: Burmite 1).

The male caddisfly embedded in amber is well preserved. Both pairs of wings are spread and their veins are visible in ventral and dorsal views. The head area is visible from the left dorso-lateral side. The left antenna is fully developed. The hind and middle legs are visible, the anterior pair of legs and its tibial spurs are more difficult to recognize. Male genitalia are visible from ventral view, but in dorsal view are covered by wings.

Male diagnosis: Ocelli absent. Antennae about as long as the forewings; each with its scapus strong, slightly longer than the head surrounded by brushes of long dark setae; pedicellus short, densely haired, combined with a scale-shaped process. Maxillary palps 3-segmented, based on a basal cardo and a strong apical stipes. In forewings apical forks I and IV absent, forks II, III and V present, discoidal cell absent; in hind wings

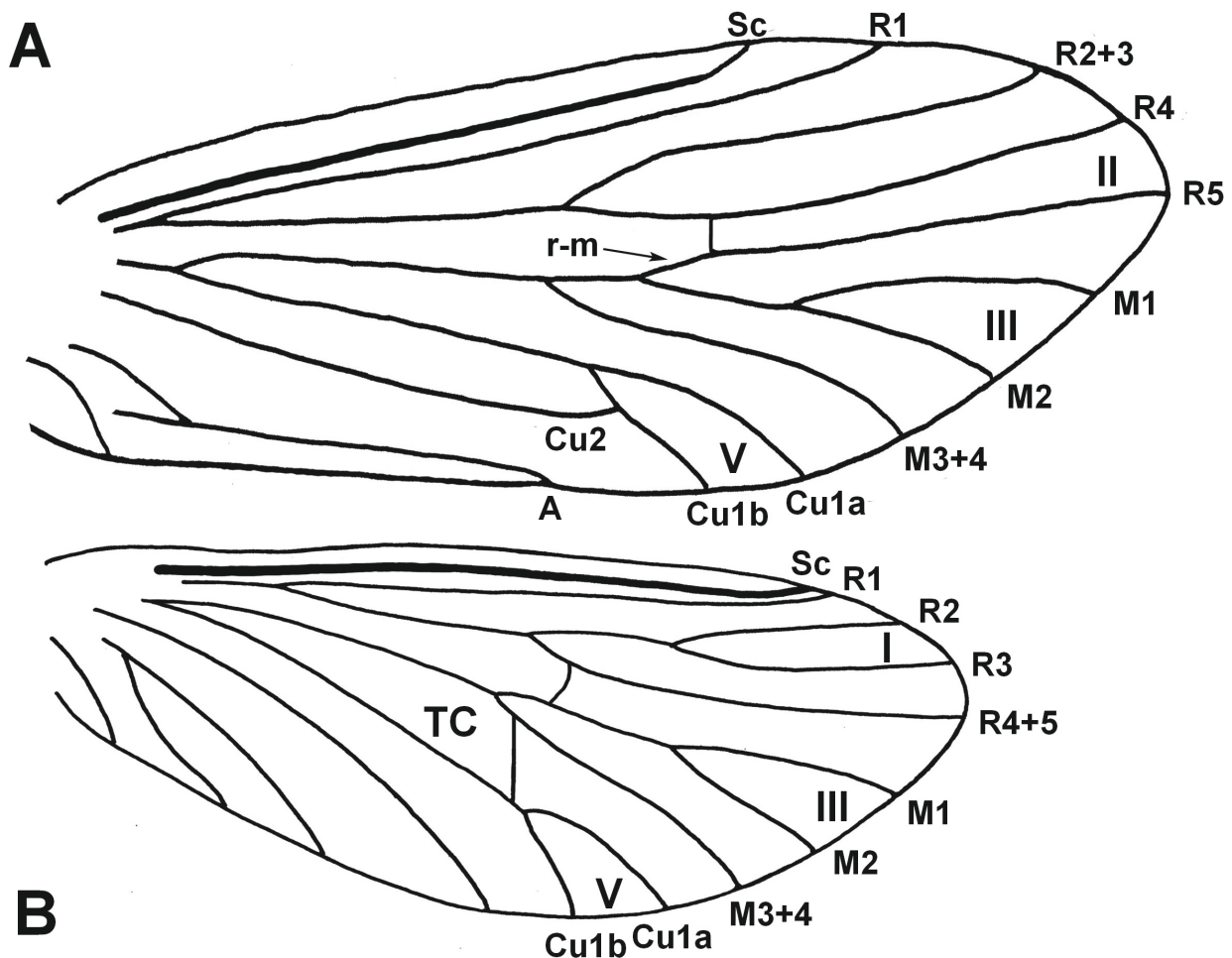


Fig. 2. Fore- and hind wing venations of *Burmapsyche wolframmei* sp. nov.; **A** – forewing: forks II, III, V; **B** – hind wing: forks I, III, V, and TC – thyridial cell.

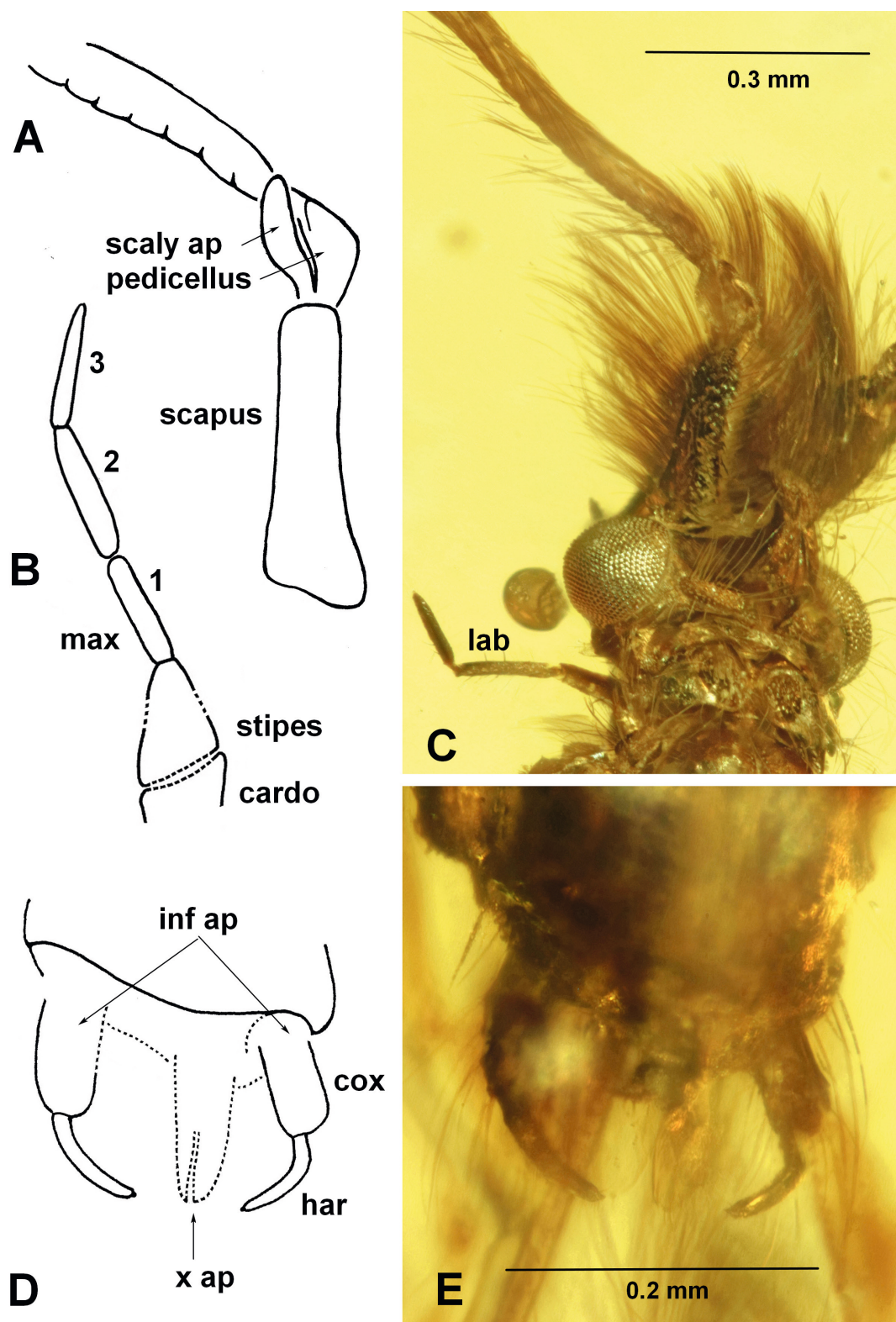


Fig. 3. *Burmapsyche wolframmei* sp. nov. **A** – Scapus, pedicellus, and basal parts of the left antenna. **B** – Three-segmented maxillary palps with stipes and cardo. **C** – Head region in left dorsolateral view. **D** – Drawing of male genital inferior appendages, ventral; cox = coxopodite (paired), har = harpago (paired), inf ap = inferior appendages (paired), x ap = apical processes of segment X. **E** – male genitalia with inferior appendages, ventral.

apical forks I, III and V present, discoidal cell absent, thyridial cell present. Inferior appendages consisting each of a broad, rectangular rounded coxopodite and a finger-shaped harpago, mesally curved. Tibial spurs formula 2/2/4.

Comparison: *Burmapsyche wolframmei* sp. nov. differs from the other two congeners by the presence of baso-laterally attached scale-like process of the pedicellus that is about as long as the pedicellus, and by the differentiated inferior appendages consisting of a broad and upright coxopodite and a finger-shaped harpago, both with same length.

Description: *Head* (Fig. 3C): Ocelli absent. Antennae each 3.8 mm in length, slightly longer than forewings, densely hairy in basal third; scapus 0.6 mm long, slightly longer than head. Pedicellus short, 0.2 mm long, accompanied by scaly process arising from its base (Fig. 3A). Scapus and pedicellus with dense, long hairs. Male maxillary palps each 3-segmented (Fig. 3B), based on strong stipes and basal cardo, terminal segment with brush of long setae. Labial palps each three-segmented.

Thorax: Pronotum with two pairs of setal warts, mesal pair of warts strikingly large and rounded. Mesoscutum with pair of setal warts, warts on mesoscutellum fused to form single, large, rounded, mesal setal wart.

Wings (Fig. 2): Forewings longer and slightly broader than hind wings, both wings with rounded apices. Forewings each about 3.2 mm long: apical forks II, III, V present, fork III petiolate, discoidal cell open, crossvein r-m present between R5 and M1+2, thyridial cell open, crossvein m-cu not visible, Cu1 branching apically in Cula and Culb (fork V), Cu2 ending on Culb. Hind wings each about 2.6 mm in length; apical forks I, III, and V present; discoidal cell open, thyridial cell closed, long; crossveins r-m and m-cu present.

Tibial spur formula: 2/2/4.

Genitalia (Fig. 3D, E): Each inferior appendage consisting of broad and upright coxopodite, appearing rectangularly rounded, apically with finger-shaped harpago curved mesad, finger-shaped, as long as stout basal coxopodite, both with same length. Behind the ventral appendages, centrally located, are two parallel, tongue-shaped lobes, possibly derived from tergum X (X ap).

4. Discussion

The superfamily Sericostomatoidea is represented in the mid-Cretaceous Burmese amber with the three families Burmaphyschidae, Cretaphyschidae, and Helicopsychidae (WICHARD 2021). Burmaphyschidae and Cretaphyschidae occur exclusively in Burmese amber, and comprises two and the six species in the genera *Burmaphysche* and *Cretaphysche*, respectively. These two families show a high agreement in the wing venations as forks II, III and V present and discoidal cell absent in forewings, and forks I, III, V present, fork II and the discoidal cell absent, and thyridial cell present in hind wings.

Otherwise, these two taxa can be differentiated by the forewings with thyridial cell absent (*Burmaphysche*) or closed and long (*Cretaphysche*), and Cu2 ending on Culb (*Burmaphysche*) or on crossvein from Culb to wing mar-

gin at arculus. The similarities in wing venation of these two taxa also reminder of the venation of the family Dyso-neuridae from the Jurassic period and initially led to the misunderstanding of the affiliation of *Burmaphysche* and *Cretaphysche* by WICHARD (2021).

Burmaphysche and *Cretaphysche* also differ clearly in the scapus and in the maxillary palps. In *Burmaphysche* the strong scapus is longer than the head, and in *Cretaphysche* scapus about as long as head. *Burmaphysche* has 3-segmented maxillary palps with terminal palpomere surrounded by brushes of long setae, whereas *Cretaphysche* maxillary palps are 5-segmented with second palpomere longest and the following three palpomeres becoming successively smaller (WICHARD & ESPELAND 2022).

The family Helicopsychidae is represented in Burmese amber by the bizarre species *Cretahelicopsycha liuyani*, which bears unusual hair-fans lengthwise and bilaterally on the fore tibiae. This species furthermore bears also typical characteristics of the family Burmaphyschidae with questionable forewing venation. *Cretahelicopsycha liuyani* was placed in the Helicopsychidae because the wing venation – so far as visible – was interpreted to be similar to that of the genus *Rakiura* (WICHARD et al. 2018a), at a time when the family Burmaphyschidae and its characteristics were not yet recognized. We hope to find another well-preserved specimen in amber that will clarify the family affiliation.

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