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Family Pseudoneureclipsidae (Insecta, Trichoptera) in mid-Cretaceous Burmese amber

WILFRIED WICHARD, PATRICK MÜLLER & THILO FISCHER

Abstract

Amberclipsis gen. nov. is an extinct genus discovered in mid-Cretaceous Burmese amber. Three new species (*A. elegans* sp. nov., *A. oblongus* sp. nov., and *A. simplex* sp. nov.) are placed in the family Pseudoneureclipsidae, characterized by the absence of fork I and the presence of fork III in hind wings and by the two-segmented inferior appendages in the form of ventral coxopodites and basodorsal harpagos in male genitalia. *Protoclipsis* gen. nov. is another extinct genus with three new species (*P. ulmeri* sp. nov., *P. picteti* sp. nov., and *P. roeseli* sp. nov.), also found in mid-Cretaceous Burmese amber. The genus is characterized by the presence of forks I, III in hind wings and by the two-segmented inferior appendages with ventral coxopodites and basodorsal harpagos in male genitalia. The affiliation of *Protoclipsis* in the family Pseudoneureclipsidae is not true; unless fork I of hind wings was lost within the family except for the ancestral lineage *Protoclipsis*.

Key words: *Pseudoneureclipsis*, *Antillopsyche*, *Amberclipsis*, *Protoclipsis*, inferior appendage, wing venation.

1. Introduction

The genus *Pseudoneureclipsis* was established by ULMER (1913) and later placed in the subfamily Pseudoneureclipsinae within family Polycentropodidae (ULMER 1951). Later, the genus *Antillopsyche* BANKS, 1941 was also placed in this subfamily by FLINT (1964), based of female and larval characters. LI et al. (2001) transferred the subfamily Pseudoneureclipsinae to family Dipseudopsidae (ULMER 1904). CHAMORRO & HOLZENTHAL (2011) elevated the subfamily to the level of a distinct family, the Pseudoneureclipsidae. The family includes only the two extant genera, *Pseudoneureclipsis* ULMER, 1913 from the Old World, which reaches its greatest diversity in the Oriental region, and *Antillopsyche* BANKS, 1941, a small endemic genus to the Greater Antilles in the New World.

Fossil representatives of the family are rare. No extinct species are known of the genus *Pseudoneureclipsis*. Of the genus *Antillopsyche*, four extinct species are known from Miocene Dominican amber (*A. auricula*, *A. digitus*, *A. oliveri*; WICHARD 2007) and Miocene Mexican amber (*A. mexicana*; WICHARD et al. 2006). Examinations of new material from mid-Cretaceous Burmese amber have revealed six previously undescribed fossil species in two new genera, one belonging to the family Pseudoneureclipsidae and the other one is closely related but tentatively placed in the superfamily Psychomyioidea, family *incertae sedis*.

2. Material and methods

The specimens are from an amber mine likely located near Noiye Bum Village, Tanaing Township, Myanmar (KANIA et al. 2015): Kachin State, but exact type localities are unknown. The age given by U-Pb dating of zircons from the volcanoclastic matrix of the amber is early Cenomanian (98.8 ± 0.6 Ma) (SHI et al. 2012), but the geological age of Burmese amber can be expected to be slightly older than the zircon date.

The Burmese amber with the embedded trichopteran inclusion was cut, face-grinded, and polished using a cutting machine and a polishing machine, a RotoPol-25 (Struers), with grinding paper for metallography: Grip 800, 1200, 2500, and 4000.

Detailed drawings and colour pictures were produced for the documentation of specimens. 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. Line drawings were digitally processed using Adobe Photoshop CS4 and Photoshop Elements 15. Measurements were made with the ocular micrometre of the Leica SApo.

Abbreviations: Wing venation terminology (after HOLZENTHAL et al. 2007): I = apical fork I; II = apical fork II; III = apical fork III; IV = apical fork IV; V = apical fork V; Cu1 = cubitus anterior; Cu2 = cubitus posterior; DC = discoidal cell; MC = median cell; TC = thyridial cell.

Male genitalia terminology (after HOLZENTHAL et al. 2007; CHAMORRO & HOLZENTHAL 2011): Inf ap = inferior appendage; coxo = coxopodite (ventral branch); harp = harpago (dorsal branch); pre ap = preanal appendage.

The amber inclusions were made available by PATRICK MÜLLER and THILO FISCHER. Holotypes described in this study are deposited in: SNSB = Zoologische Staatssammlung München, Germany; ZFMK = Zoological Research Museum Alexander Koenig, Bonn, Germany.

This published work and the nomenclatural acts it contains have been registered in ZooBank on 12 November 2021 and have received the LSID number urn:lsid:zoobank.org:pub:AAECE4FD-1530-4D89-B479-279ADC91E7CD

3. Systematic palaeontology

Order Trichoptera KIRBY, 1815

Suborder Annulipalpia MARTYNOV, 1924

Superfamily: Psychomyioidea WALKER, 1852

Family Pseudoneureclipsidae ULMER, 1951

Type genus: *Pseudoneureclipsis* ULMER, 1913.

Diagnosis (adapted to the amber fossils and modified after LI et al. 2001; MALICKY 2009; CHAMORRO & HOLZENTHAL 2011):

Head: Ocelli absent. Maxillary palps 5-segmented; segments 1 and 2 short, segments 3 and 4 longer, terminal segment longest, elongated, with suture-like cross striae. Antennae about as long as forewings. Scapus stronger and pedicellus smaller than following flagellomeres.

Thorax: Pronotum transversal with fused lateral and medial warts. Mesonotum with a pair of rounded mesoscutal setal warts and a single large rounded mesoscutellar setal wart.

Tibial spurs: 3/4/4.

Wings: Forewing pattern consists of pale spots distributed over the light brown wing membrane. Forewings with forks I, II, III, IV, (V), but fork V absent in *Pseudoneureclipsis*; discoidal, median, and thyridial cells usually closed. In hind wings forks II, III, V present; discoidal cells closed or open.

Male genitalia: Fossil caddisflies embedded in amber often assume a body posture in which the genitalia are visible only from ventral view. Lateral or dorsal views are usually obstructed by their wings in a saddle-roof fashion. In male genitalia, usually only the paired inferior appendages are clearly visible ventrally. In the Pseudoneureclipsidae the inferior appendages are two-segmented and consist of a ventral branch (coxopodite) and a basodorsal branch (harpago), which are not attached distally to the coxopodite as usual, but arise basodorsally from the ventral coxopodite.

A key to genera for males of Pseudoneureclipsidae

The combination of tibial spurs 3/4/4, of apical forks II, III, V in the hind wings and of two-segmented inferior appendages consisting of ventral branches (coxopodites) and basodorsal branches (harpagos) is diagnostic for the family Pseudoneureclipsidae.

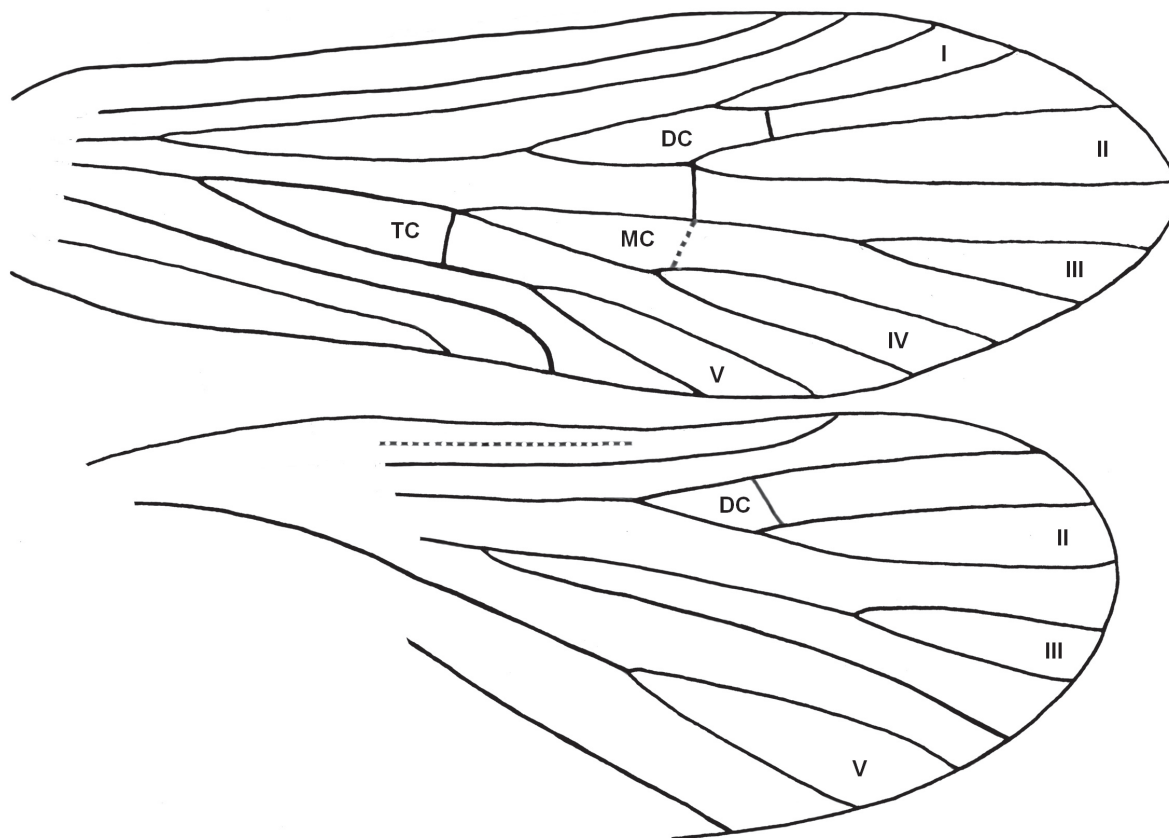


Fig. 1. Fore- and hind wing venations of *Amberclipsis* spp. in Burmese amber; forewing: forks I, II, II, IV, V; DC – discoidal cell, MC – median cell, TC – thyridial cell; hind wing: forks II, III, V; DC – discoidal cell.

- | | | |
|---|--|-----------------------------|
| 1 | Forewing fork V absent | <i>Pseudoneureclipsis</i> |
| - | Forewing fork V present | 2 |
| 2 | Inferior appendages with ventral coxopodite short, scale-like, basodorsal harpagos apically curved | extant <i>Antillopsyche</i> |
| - | Inferior appendages with ventral coxopodite elongate, apically curved, basodorsal harpagos straight oriented | extinct <i>Amberclipsis</i> |

Genus *Amberclipsis* nov.

Fig. 1

urn:lsid:zoobank.org:act:D2E2127D-C3B1-410A-B624-F4A245E665E6

E t y m o l o g y : *Amberclipsis*, named after embedded in the amber.

T y p e s p e c i e s : *Amberclipsis elegans* sp. nov.

D i a g n o s i s : *Amberclipsis* has pseudoneureclipsid characters that are present in extant *Antillopsyche* and *Pseudoneureclipsis*: e.g., 5-segmented maxillary palps with annulated terminal segments, tibial spurs 3/4/4, wing venation with fork III in hind wings, in male genitalia 2-segmented inferior appendages consisting of ventral branches (coxopodites) and basodorsal branches (harpagos).

Wings (Fig. 1): Forewings with forks I, II, III, IV, V; discoidal, median, and thyridial cells usually closed. Forewings about 3 mm long. In hind wings forks II, III, V present; discoidal cells usually closed. (Embedded in amber, crossveins of hyaline wings are often difficult to detect.)

Male genitalia: The extinct *Amberclipsis* gen. nov. differs from extant genera *Antillopsyche* and *Pseudoneureclipsis* in the inferior appendages by the ventral coxopodites (ventral branch), which are elongate, narrow and always inclined apically curved, and by the basodorsal harpagos (dorsal branch), which are elongate, often needle-like narrow and always oriented straight, often terminated in an apical small bulb.

The extinct *Amberclipsis* species are distinguished by the male genitalia. Embedded in amber, the genitalia are visible in ventral view and allow species diagnostics according to the inferior appendages.

Amberclipsis elegans sp. nov.

Fig. 2

urn:lsid:zoobank.org:act:9DE5410C-17D8-4220-B515-0D39C31C5A77

E t y m o l o g y : Named after the elegant (*lat.* = *elegans*) coxopodite of the inferior appendages.

H o l o t y p e : Male, SNSB-ZSM-TRI-AMB001, kept in the amber collection of the Bavarian State Collection of Zoology, Munich, Germany (former THILO FISCHER collection, no. 7414). Right fore- and hind wings spread apart, wing venations of both wings significantly. The bizarre constructions of the inferior appendages clearly visible in ventral view.

T y p e l o c a l i t y : Mid-Cretaceous Burmese amber inclusion; Myanmar – Kachin State.

D i a g n o s i s : In inferior appendages (Fig. 2B, C), ventral coxopodites broad in basal part and elegantly curved apically;

apical part narrow and distinctly wavy. Basodorsal harpagos filiform, straight and bearing a small bulb at apex. The curved coxopodites slightly cover the apical bulbs of the harpagos.

D e s c r i p t i o n : Head with ocelli absent. Antennae filiform; a slightly stout scapus, a smaller pedicellus, followed by about 30 cylindrical flagellomeres, gradually elongating posteriorly. The total lengths of the antennae approximately equal to the lengths of the forewings. Length of forewing: about 3 mm. Forewing fork I stalked, about half as long as fork II, sessile. Discoidal cell closed, slender; crossvein s oblique. Hind wing broader than forewing, venation with forks II, III, and V; discoidal cell closed, crossvein s indicated.

Amberclipsis oblongus sp. nov.

Fig. 3

urn:lsid:zoobank.org:act:B7552AC5-A5AB-4B6D-82F3-A380D0874840

E t y m o l o g y : Named after the elongate (*lat.* = *oblongus*) inferior appendages.

H o l o t y p e : Male, ZFMK-TRI000823, kept in the amber collection of the Museum Zoological Research Museum Alexander Koenig, Bonn, Germany (former PATRICK MÜLLER collection, BUB 2830). Male well-preserved, wings clear, body and genitalia dark toned. The antennae, maxillary palps and legs present. Inferior appendages of male genitalia visible in ventral view.

T y p e l o c a l i t y : Mid-Cretaceous Burmese amber inclusion; Myanmar – Kachin State.

D i a g n o s i s : In inferior appendages (Fig. 3B, C), ventral coxopodites elongate tapering toward apical and curve slightly inward. The filiform harpagos arise from the basal coxopodites, running elegantly straight and apically bearing a small bulb. The basodorsal harpagos slightly overhang the ventral coxopodites.

D e s c r i p t i o n : Head with ocelli absent. Antennae with a slightly stout scapus, a smaller pedicellus, flagellum with about 30 cylindrical flagellomeres, gradually elongating posteriorly. Antennae approximately equal to the lengths of forewings with about 3 mm. In forewing fork I – V present; discoidal cell closed; crossvein s oblique. Hind wing little broader than forewing, venation with forks II, III, and V; discoidal cell closed, crossvein s present (in this holotype crossvein m well visible).

Amberclipsis simplex sp. nov.

Fig. 4

urn:lsid:zoobank.org:act:F64661C5-A3D2-4AF6-82A0-DAE419654046

E t y m o l o g y : Named after the simply (*lat.* = *simplex*) constructed inferior appendages.

H o l o t y p e : Male, ZFMK-TRI000824, kept in the amber collection of the Museum Zoological Research Museum Alexander Koenig, Bonn, Germany (former PATRICK MÜLLER collection, BUB 3582). Body well-preserved, but embedded in slightly cloudy amber, filled with numerous dot-shaped inclusions. Antennae, maxillary palps and legs present. Forewings visible but slightly twisted. Inferior appendages of male genitalia visible ventrolateral.

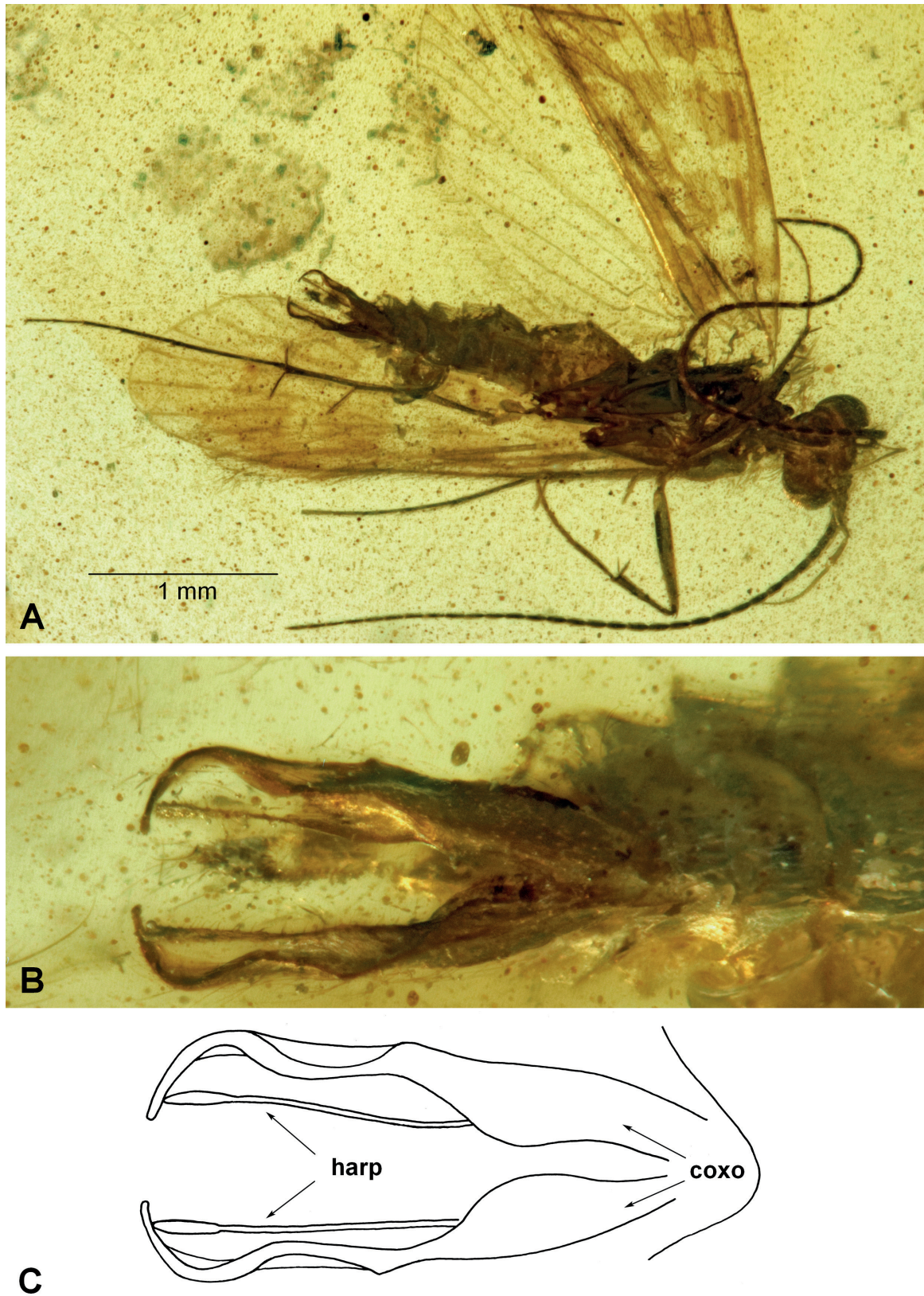


Fig. 2. *Amberclipsis elegans* gen. nov., sp. nov. **A** – Male holotype (SNSB-ZSM-TRI-AMB001). **B** – Male genitalia, ventral. **C** – Inferior appendages, ventral.

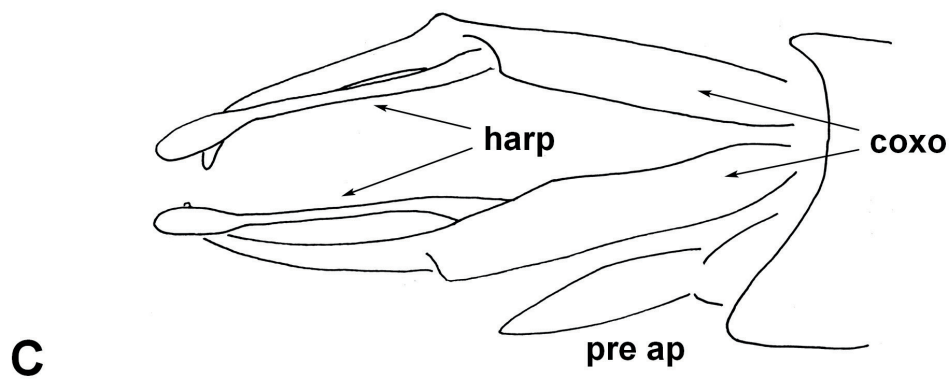
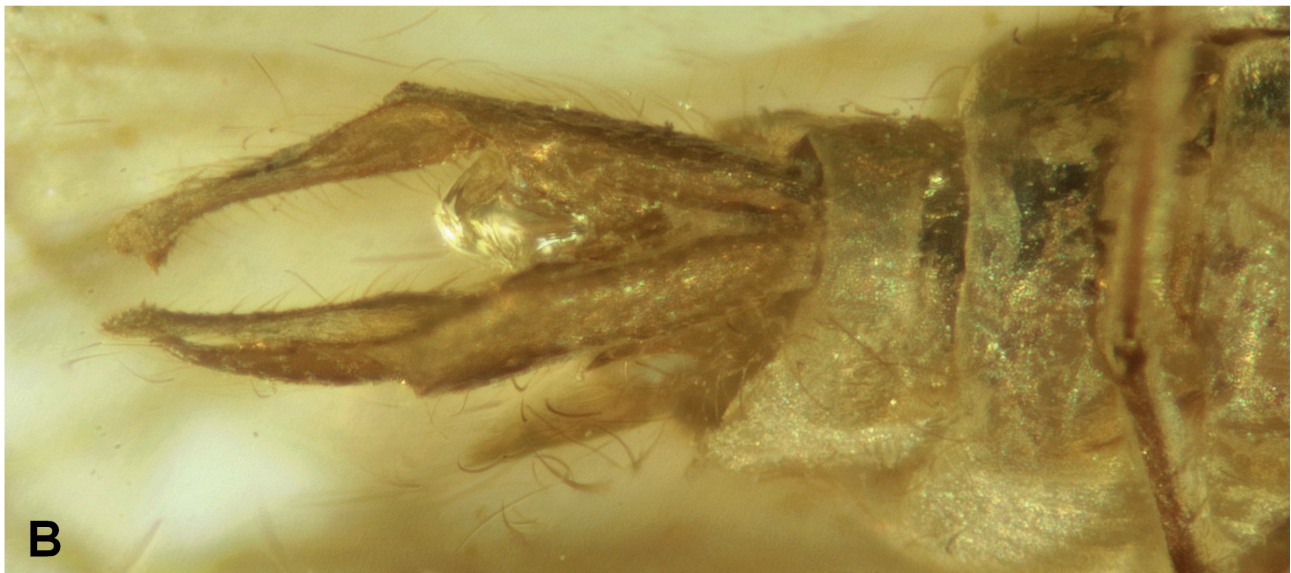
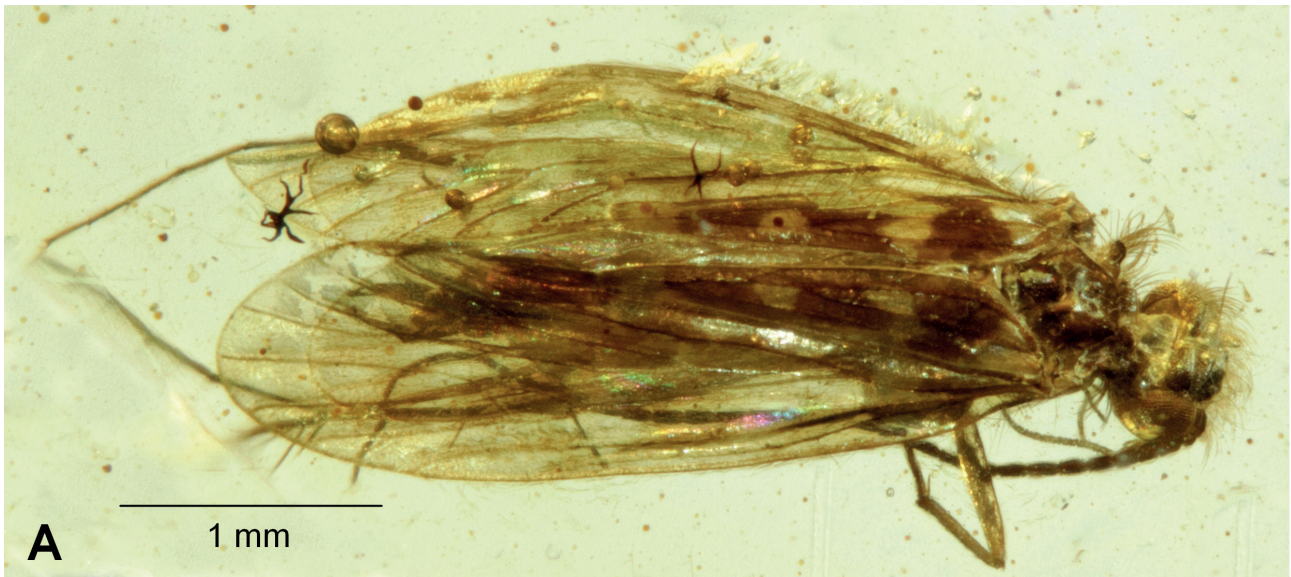


Fig. 3. *Amberclipsis oblongus* gen. nov., sp. nov. **A** – Male holotype (ZFMK-TRI000823). **B** – Male genitalia, ventral. **C** – Inferior appendages, ventral.

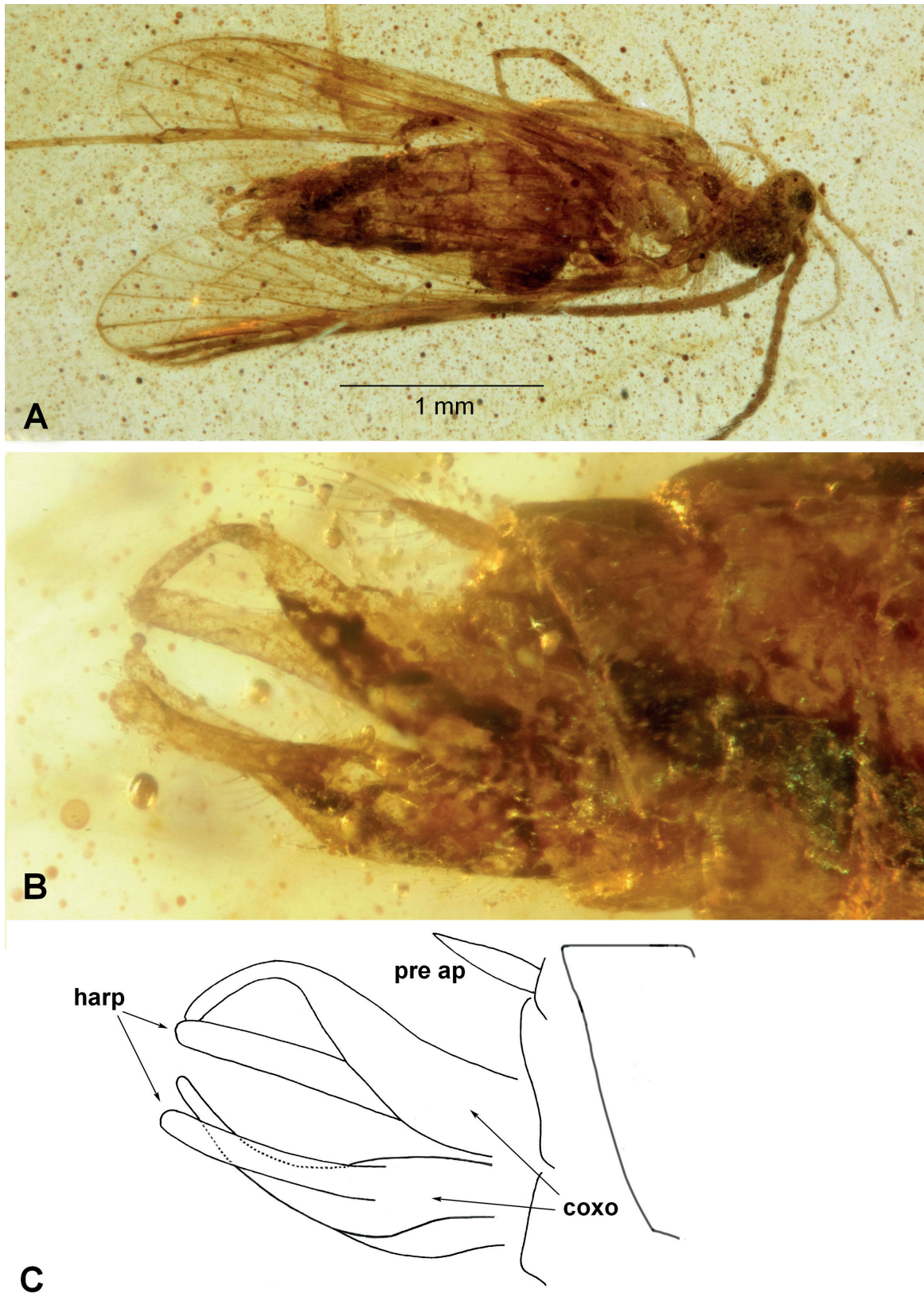


Fig. 4. *Amberclipsis simplex* gen. nov., sp. nov. **A** – Male holotype (ZFMK-TRI000824). **B** – Male genitalia, lateroventral. **C** – Inferior appendages, ventral.

Type locality: Mid-Cretaceous Burmese amber inclusion; Myanmar – Kachin State.

Diagnosis: In inferior appendages (Fig. 4 B, C), ventral coxopodites basally broad and scaly, tapering toward apical forming an arch slightly inward. Harpagos arising basodorsally from coxopodites and running straight, with rounded end of harpagos touching curved tip of coxopodites. Coxopodites and harpagos reaching an equal length level.

Description: Head with ocelli absent. Antennae filiform, consisting of a slightly stronger scapus, a smaller pedicellus and about 30 cylindrical flagellomeres. Lengths of the antennae approximately equal to lengths of forewings, at about 3 mm. Forewings and hind wings with characteristic venation of the genus. Forewing with apical forks I–V; discoidal, median and thyridial cells present. Hind wing with forks II, III and V, discoid cell probably closed, and crossveins present.

Superfamily Psychomyioidea WALKER, 1852

Family *incertae sedis*

Genus *Protoclipsis* nov.

urn:lsid:zoobank.org:act:7C9FB53D-ED7E-4826-AF0D-1004769064BA

Etymology: Name combines prefix proto- (Greek), meaning first, earliest, and suffix -eclipsis. The name based on the affinity that the taxon appears to have between Polycentropodidae (*Neureclipsis*-cluster) and Pseudoneureclipsidae.

Type species: *Protoclipsis ulmeri* sp. nov.

Diagnosis: Head: Ocelli absent, filiform antennae, as long as about the forewing length, 5-segmented maxillary palps with annulated terminal segments.

Thorax (Fig. 6B): Pronotum transversal with weakly fused lateral and medial warts. Mesonotum with a pair of rounded mesoscutal setal warts and a single large rounded mesoscutellar setal wart.

Tibial spurs: 3/4/4.

Wings: The lengths of the forewings varying species-specifically between about 4.8–2.2 mm. In forewings, apical forks I, II, III, IV, V present; discoidal, median, and thyridial cells closed. In hind wings, forks I, II, III, V present; discoidal cells closed. These wing venations correspond to the polycentropodid *Neureclipsis*-cluster in the presence of forks I and III in hind wings (sensu OLÁH & JOHANSON 2010) and differ from all extant and extinct Pseudoneureclipsidae species in the presence of fork I in the hind wings.

Male genitalia: The 2-segmented inferior appendage consists of a ventral branch (coxopodite) and a basodorsal branch (harpago), which is not attached distally to the coxopodite as usual, but arises basodorsally from the ventral branch. These 2-segmented inferior appendages are characteristic of Pseudoneureclipsidae (MALICKY 2009) and are distinctly different from the unsegmented inferior appendages of Polycentropodidae.

Remarks: The close phylogenetic proximity of the Pseudoneureclipsidae to the Polycentropodidae is undisputed, even if the sister group relationship is not completely clarified. According to JOHANSON et al. (2012), the sister group of Pseudoneureclipsidae consists of Polycentropodidae + Ecnomidae, based on protein-coding genes. CHAMORRO & HOLZENTHAL (2011) suggest

again a possible sister group relationship between Pseudoneureclipsidae and Polycentropodidae, which has already been analyzed and discussed with regard to morphology and molecular data (HOLZENTHAL et al. 2007).

Protoclipsis – so far as visible – carries characteristics that apply to the polycentropodid *Neureclipsis* cluster (hind wing venation with apical forks I and III) and Pseudoneureclipsidae (two-segmented inferior appendages with characteristic ventral coxopodite and basodorsal harpago). The presence of fork I in hind wings is absent in the extant and extinct pseudoneureclipsid species, but present in the polycentropodid *Neureclipsis*- and *Polycentropus*-clusters. Fork III in hind wings is present only in the *Neureclipsis*-cluster as well as in Pseudoneureclipsidae. Family affiliation of this genus remains unclear. There are two contradictory possibilities, either *Protoclipsis* belongs to Pseudoneureclipsidae, or to the *Neureclipsis*-cluster of Polycentropodidae. Hopefully, further fossil findings and taxonomic data will resolve this issue.

However, it is noteworthy that in *P. ulmeri* the structure of the inferior appendages largely agrees with *Antillopsyche*, whose ventral coxopodites are short, quadrate, and scale-like, and whose basodorsal finger-like harpago are curved slightly inward. The inferior appendages of *P. picteti* sp. nov. and *P. roeseli* sp. nov. apparently agree with *Amberclipsis*, whose ventral coxopodites are elongate, apically curved, and whose basodorsal harpago are straightly directed and terminated in an apical small bulb. The three new species of *Protoclipsis* described below, are dedicated to three prominent pioneers of Insecta and Trichoptera research.

Protoclipsis ulmeri sp. nov.

Fig. 5

urn:lsid:zoobank.org:act:1641785D-7AFE-49B7-A252-D3343B015296

Etymology: The fossil species *Protoclipsis ulmeri* is dedicated to GEORG ULMER (1877–1963).

Holotype: Male, ZFMK-TRI000825, kept in the amber collection of the Museum Zoological Research Museum Alexander Koenig, Bonn, Germany (former PATRICK MÜLLER collection, BUB 2593). Body sufficiently well-preserved, superficially in a few small areas with slight abrasions. Antennae, maxillary palps and legs partially present. Forewings well visible, hind wing venation distinctly translucent. Inferior appendages of male genitalia visible ventrolaterally.

Type locality: Mid-Cretaceous Burmese amber inclusion; Myanmar – Kachin State.

Diagnosis: In inferior appendages (Fig. 5B, C), ventral coxopodites are broad and short, almost square, rhombic. The posterior basodorsal harpagos in the form of a curved finger (or claw), attach deep basally to the inner surfaces of the coxopodites. These inferior appendages similar to those of pseudoneureclipsid genus *Antillopsyche*.

Description: Head with ocelli absent. Antennae filiform, consisting of a stronger scapus, a smaller pedicellus and more than 30 cylindrical flagellomeres. Length of antennae nearly equal to length of forewing at about 4.8 mm. In forewings apical forks I, II, III, IV, V present; discoidal, median, and thyridial cells closed. In hind wings (Fig. 5 D) forks I, II, III, V present; discoidal cells closed.

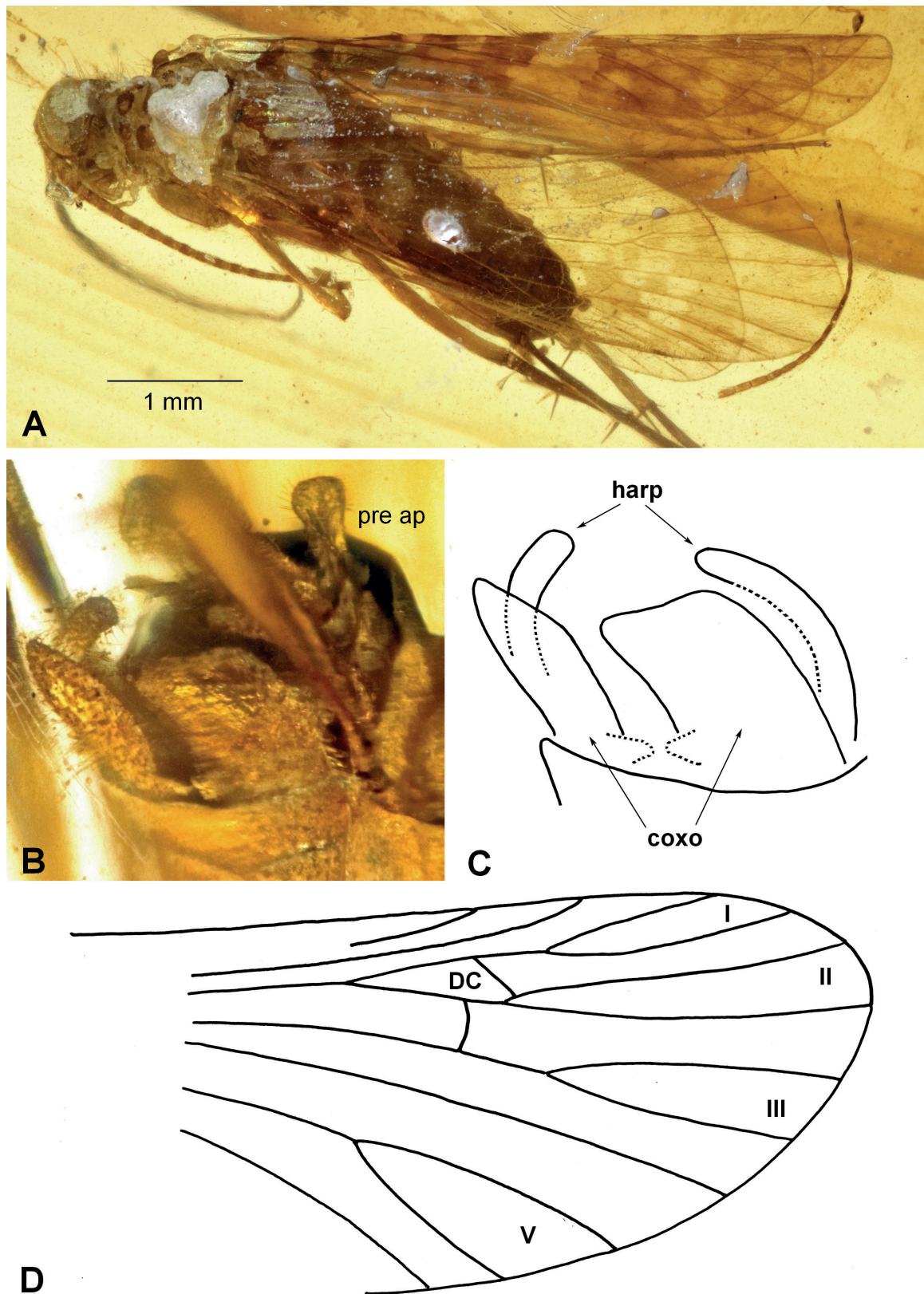


Fig. 5. *Protoclipsis ulmeri* gen. nov., sp. nov. **A** – Male holotype (ZFMK-TRI000825). **B** – Male genitalia, lateroventral. **C** – Inferior appendages, lateroventral. **D** – Hind wing with apical forks I, II, III, V; and discoidal cell.

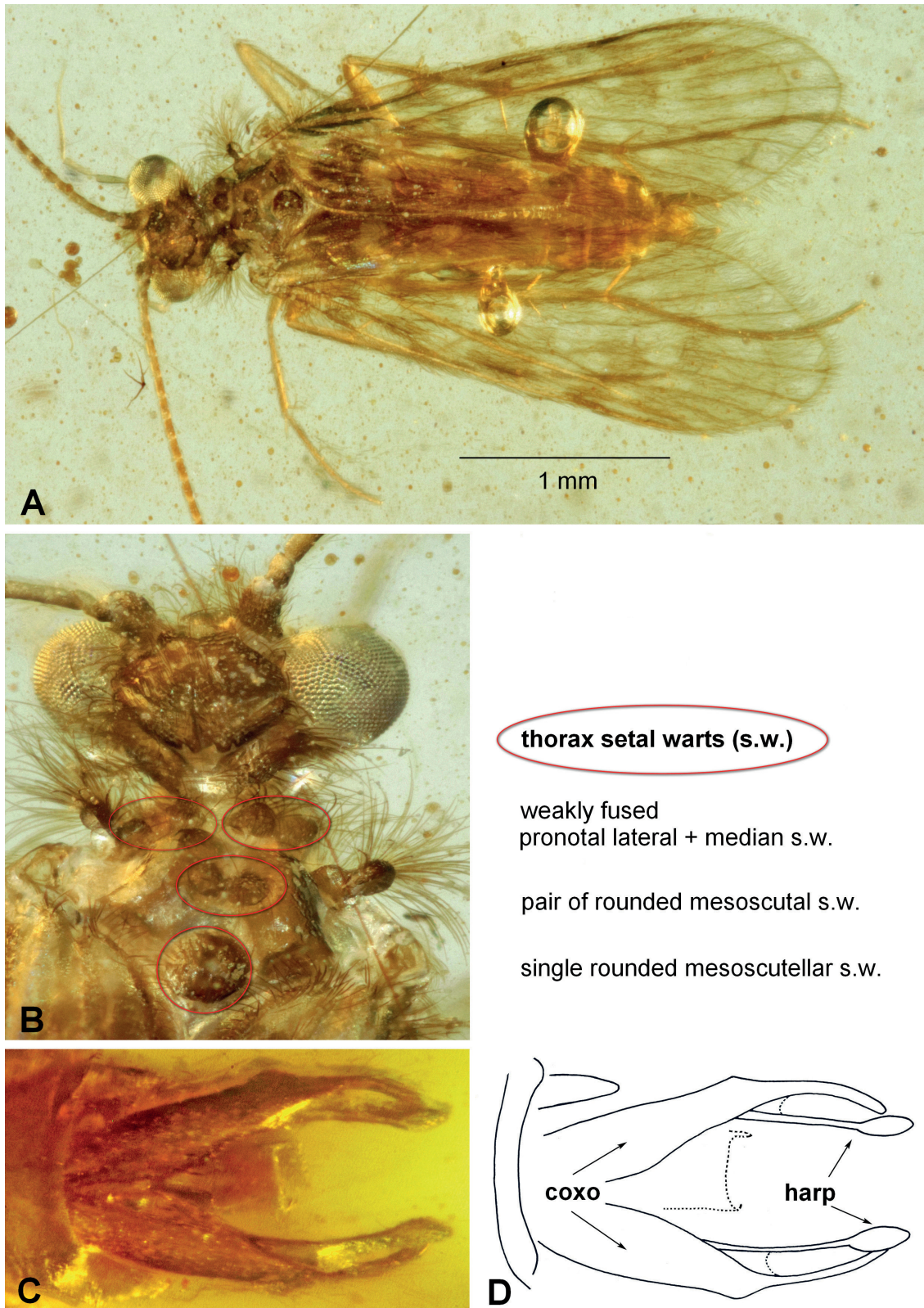


Fig. 6. *Protoclipsis picteti* gen. nov., sp. nov. **A** – Male holotype (ZFMK-TRI000826). **B** – Head and thorax, dorsal; pronotal setose warts (medial warts weakly fused); pair of rounded mesoscutal and single rounded mesoscutellar setose warts. **C** – Male genitalia, ventral. **D** – Inferior appendages, ventral.

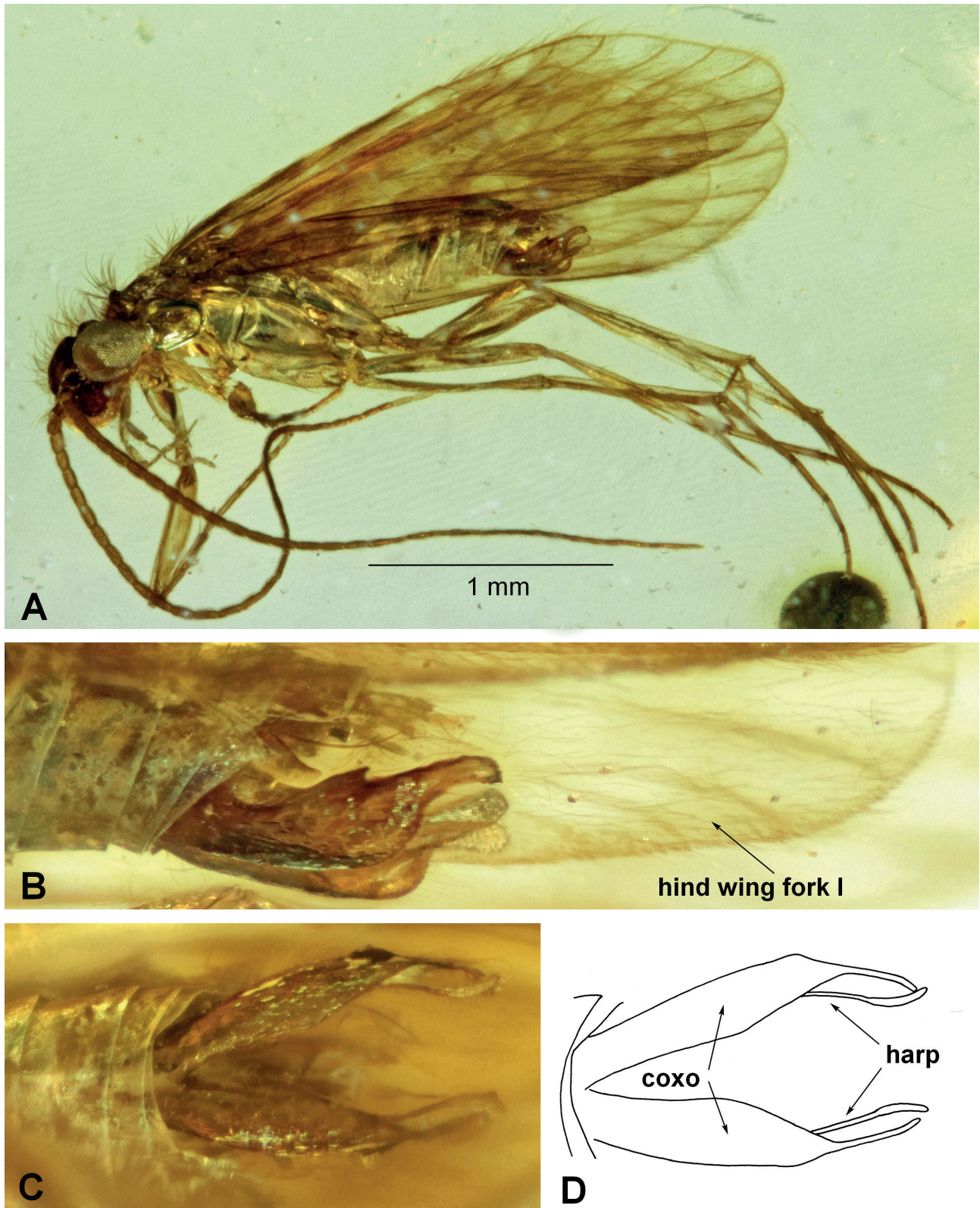


Fig. 7. *Protoclipsis roeseli* gen. nov., sp. nov. **A** – Male holotype (ZFMK-TRI000827). **B** – Male genitalia, lateral; hind wing with apical fork I. **C** – Male genitalia, ventral. **D** – Inferior appendages, ventral.

Protoclipsis picteti sp. nov.

Fig. 6

urn:lsid:zoobank.org:act:4321932E-C422-4A06-919D-CFB-78844FF5C

E t y m o l o g y : The fossil species *Protoclipsis picteti* is dedicated to FRANÇOIS-JULES PICTET (1809–1872).

H o l o t y p e : Male, ZFMK-TRI000826, kept in the amber collection of the Museum Zoological Research Museum Alexander Koenig, Bonn, Germany (former PATRICK MÜLLER collection, BUB 753). Body in dorsal and ventral view, in dorsal view hind wings covered by the forewings. Right antenna partially present as well the maxillary palps and the legs. Inferior appendages of the male genitalia well visible in ventral view

T y p e l o c a l i t y : Mid-Cretaceous Burmese amber inclusion; Myanmar – Kachin State.

D i a g n o s i s : In the inferior appendages (Fig. 6C, D) ventral coxopodites basally broad, tapering toward apical, elongate, terminally inclined toward genital center. Basodorsal harpagos, filiform, straight, bearing a small bulb at apex. The inferior appendages resemble those of the pseudoneureclipsid genus *Amberclipsis* gen. nov.

D e s c r i p t i o n : Head with ocelli absent. Antennae filiform, composed of a stronger scapus, a smaller pedicellus, and the following cylindrical flagellomeres that gradually lengthen distad. Antennae little longer than forewings. Length of forewing: about 2.8 mm. In forewing forks I–V, fork I petiolate, small, fork II long, sessil. Discoidal, median and thyridial cells present. In hind wings fork I, fork II long, forks III and V smaller; discoidal cell closed.

Protoclipsis roeseli sp. nov.

Fig. 7

urn:lsid:zoobank.org:act:134CF5BA-5F03-4537-A2F0-2ADD8D4FF0E1

E t y m o l o g y : The fossil species *Protoclipsis roeseli* is dedicated to AUGUST J. ROESEL VON ROSENHOF (1705–1759).

H o l o t y p e : Male, ZFMK-TRI000827, preserved in the amber collection of the Zoological Research Museum Alexander Koenig, Bonn, Germany (former PATRICK MÜLLER collection, BUB 3595). Body well preserved, in lateral view. Antennae, maxillary palps and legs present. Wing venation of forewings and partially of hind wings visible. Male genitalia with inferior appendages in lateral and ventral view.

T y p e l o c a l i t y : Mid-Cretaceous amber inclusion; Myanmar – Kachin State; exact locality unknown.

D i a g n o s i s : In the inferior appendages, the ventral coxopodites are broad in lateral view (Fig. 7B), bulbously curved at the ventral margin, the dorsal margin bearing a spine. The apical part of the coxopodite much shorter, narrow and rounded at the end. In ventral view (Fig. 7C), the basal part coxopodites appears relatively stout and elongate, and the terminal shorter part thin and slightly inclined toward the genital center. The basodorsal harpago needle-like thin, running straight. Posterior end with a bulb; in ventral view it is flat, elongate and slightly curved. The inferior appendages similar in form to those of extinct pseudoneureclipsid *Amberclipsis* species.

D e s c r i p t i o n : Head with ocelli absent. Antennae filiform, consisting of a stronger scapus, a smaller pedicellus and about 34 cylindrical flagellomeres. Lengths of antennae nearly equal to lengths of forewings at about 2.2 mm.

4. Discussion

The occurrence of the extinct genus *Amberclipsis* in mid-Cretaceous Burmese amber suggests that the family Pseudoneureclipsidae may have its origins in the Old World. Especially since the species-rich *Pseudoneureclipsis* inhabits the southern parts of the Old World (East Asia, Africa, Madagascar, and the northern Mediterranean) (MALICKY 2020), while the species-poor *Antillopsyche* is endemic to the Caribbean in the New World (HOLZENTHAL & CALOR 2017).

The extinct *Amberclipsis* is apparently closely related to extant *Antillopsyche*. In both genera, the forewing venation has a complete set of apical forks I–V, while in *Pseudoneureclipsis* fork V is absent. However, *Antillopsyche* and *Amberclipsis* differ in the inferior appendages. Their geographic separation between distributions of these genera, in the New World (Caribbean) and the Old World (Southeast Asia) is difficult to explain at present. It possibly may be due to an ancestral lineage that originated in the Triassic or Permian, when continents were united in Pangaea.

The extinct genus *Protoclipsis* gen. nov., which was also found in mid-Cretaceous Burmese amber, seems to be closely related to the family Pseudoneureclipsidae, although it shares characters both with Polycentropodidae and Pseudoneureclipsidae. *Protoclipsis* has fork I and fork III in the hind wing, reminding of polycentropodid *Neureclipsis*-clusters (OLÁH & JOHANSON 2010). *Protoclipsis*, however, has two-segmented inferior appendages with ventral coxopodites and basodorsal harpago in the male genital and is placed with this sexual feature close to the Pseudoneureclipsidae.

In addition, *Protoclipsis ulmeri* sp. nov. has inferior appendages with ventral coxopodites that are short and scale-like, and apically curved basodorsal harpago, overall very similar to the appendages of Caribbean *Antillopsyche*. Instead, *Protoclipsis picteti* and *Protoclipsis roeseli* have inferior appendages with ventral coxopodites that are elongate and apically curved and straightly oriented basodorsal harpagos. Their inferior appendages are largely consistent with those of the fossil genus *Amberclipsis*.

The presence of fork I in the hind wings of *Protoclipsis* precludes assignment to the family Pseudoneureclipsidae. Unless the hind wing fork I was lost within the family in the lineage following *Protoclipsis*. Thus, the family affiliation of the fossil species *Protoclipsis* gen. nov. remains unclear for the time being.

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