

## A problematic further specimen of *Heliadesdakruon morganae* Cumming & Le Triant, 2021 (Psocoptera: Trogiomorpha) from Burmese amber

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**ABSTRACT:** A psocid specimen preserved in Burmese amber was investigated and tentatively determined as *Heliadesdakruon morganae* Cumming & Le Triant, 2021. Some features, which were not discussed in the original description of the species are described. Moreover, remarkable differences between the holotype of *Heliadesdakruon morganae* and some paratype specimens illustrated by photographs in the original description of this species as well as the examined specimen were pointed out. Examination of further material would be necessary to know whether *H. morganae* is a rather variable species, or representatives of not only one *Heliadesdakruon* Cumming & Le Triant, 2021 species came to light already. On the basis of wing peculiarities the genus *Heliadesdakruon* belongs to the family Empheriidae independently of the acceptance or refusal of the recent synonymization of Archaeatropidae where this genus was placed in originally. A slight modification of the description of the genus *Heliadesdakruon* is proposed.

### Introduction

The Burmese amber seems to be an inexhaustible gold mine of fossilized Cretaceous inclusions. Total number of species reported from this mineral reached 2805 up to end of 2023. Most (2094) of them Insecta (= Hexapoda). On the other hand, representation of the order Psocoptera (37 species) is relatively moderate (Ross 2024).

In the last year the Savaria Museum (Szombathely, Hungary) obtained a Burmese amber piece containing an insect inclusion, and the present author had an invitation to investigate it. The given insect specimen is well preserved, however, its laying not an optimal one: considerable part of the right fore wing is behind the body, while the slightly bent left wings are visible in an acute angle (Fig. 1). However, on the basis of the structure of head capsule and the visible parts of wing venation the studied specimen proved to belong to a psocid species obviously.

As the exact age of the fossilization of the Burmese amber regards there is some uncertainty because usually the age of the imbedding rocks are investigated and not directly the amber. Nevertheless, it may be concluded that most of the northern Burmese amber was deposited about 100 Ma, i.e.: near to the border between Early and Late Cretaceous Epochs (Yu *et al.* 2019, Zheng *et al.* 2021). Surely it is the age of the examined amber piece also because it was originated from one of the amber mines of northern Myanmar with very high probability.

## Methods

The investigations were carried out at 75–300x magnification by PZO SK 14 light microscope. Photographs for Figs 2, 3 were taken by camera of a Samsung Galaxy S21FE instrument from the same microscope, while for the Fig. 1 the photograph was taken using a Nikon D7200 camera with Helicon Remote and Helicon Focus softwares. As the wing venation regards the generally accepted terminology in the order Psocoptera is followed – including the abbreviations.

## Results and discussion

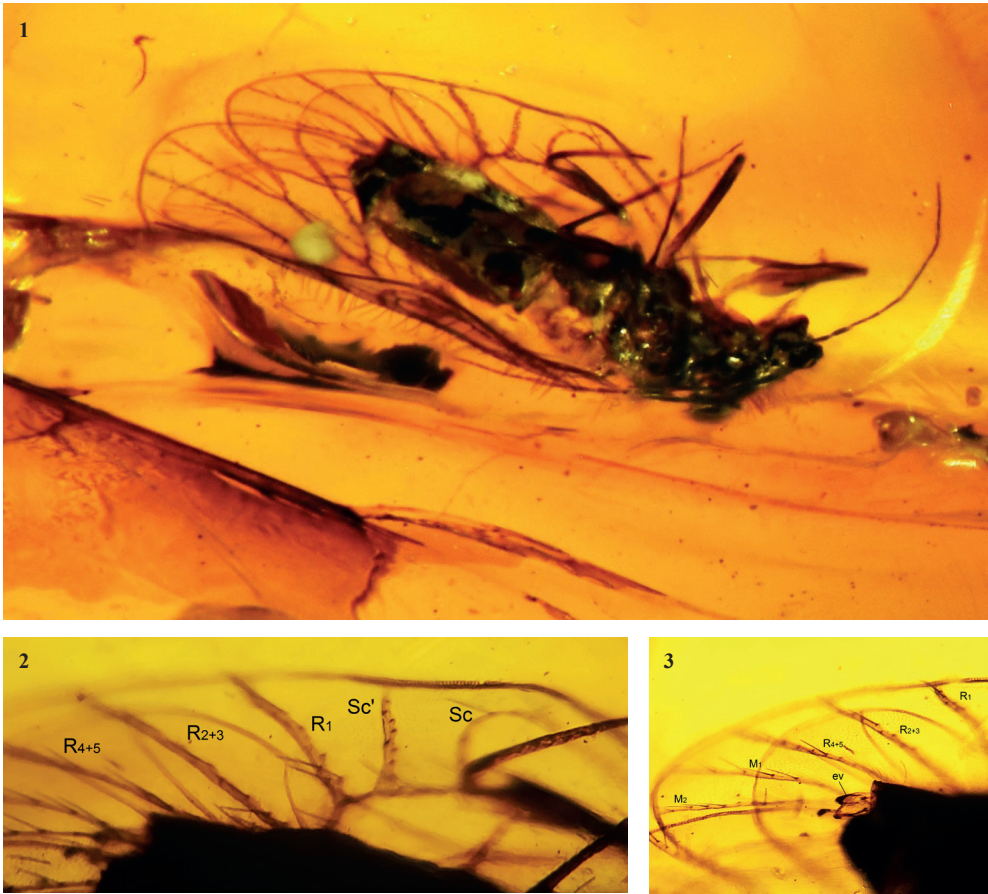
The enclosing amber piece 24 x 16.5 x 8.5 mm. It does not contain inclusions apart from a single psocopteran female. Length of the insect body 1.8 mm, with abdomen of 1.1 mm. Head broad (width: 0.5 mm) and short, with dense erected hairs on occiput, each approximately 0.1 mm long. Eyes black, globular, protruding, with diameter of 0.17 mm. Antennae broken; number of remaining segments 17 (left) and 23 in three separate parts (right). Wing membrane hyalin. Fore wing 2.3 mm. Longitudinal vein Sc of this wing running paralell with the anterior margin, then curving sharply inwards and slightly backwards reaching the elongated distal closed cell (more exactly the proximal part of  $R_1$ ). Setae are present on both side of this vein for most of the length, but after the sharp bend it has a singular line of setae (Fig. 4). Sc' runs from the distal closed cell to the wing margin reaching it in a right angle (Figs 2, 4). Proximal parts of Rs and M converging in an acute angle (Fig. 5). Vein bordering distal closed cell between Sc and Sc' marked with double setae. Veins  $M_1$ ,  $M_2$  and the visible parts of  $R_{2+3}$ ,  $R_{4+5}$ ,  $M_3$  and  $Cu_1$  have a singular line of setae (Figs 3, 4). Hind wing 1.9 mm, paddle shaped. Tibiae about as long as femora and have a pair of strong spurs at their distal ends. Tarsi three-segmented; basal segment about two times longer than the other two together. Claws without preapical tooth and pulvillus (Fig. 6). External valvulae of the genitalia J-shaped (Fig. 3).

On the basis of the features written above it may be concluded that the studied specimen belongs to the species *Heliadesdakruon morganae*. Additionally, two further characteristics were observed which, though were not mentioned in the original description (CUMMING & LE TRIANT 2021) of *H. morgane*, are not in opposite with it: membrane of wings are densely covered by microtrichia, and not only the tibiae but the tarsomeres are armed also with a pair of distal spurs (Fig. 6). (Microtrichia seems to be more dense on hind wings than on fore wings.)

On the other hand, Sc' and distal part of  $R_1$  significantly thickened, there are setae on both side of these veins and somewhat also on  $R_{2+3}$ , while these veins has a single line of setae according to the text of the original description of *H. morganae*. Moreover, stem of M connected to Rs (i.e.: to the distal closed cell) with a short cross vein (Fig. 5) (therefore distal close cell six angled), while in original desriptions of *H. morganae* and the genus *Heliadesdakruon* Cumming & Le Triant, 2021 these veins fuse for a considerable distance (CUMMING & LE TRIANT 2021: Fig. 4), giving a seven angled shape of the distal closed cell.

Regarding the above mentioned differences, it seems to be possible that the examined specimen represents an undescribed species of the genus *Heliadesdakruon*. This possibility appears to be confirmed by the statement of CUMMING & LE TRIANT (2021) that within the significant paratype sampling of *H. morganae* the venation was rather stable and they found slight differences only in the hind wing of some specimens. On the other hand, paratypes, de-

monstrated by the figs 5B, 5D in the original description, have double setae on distal part of  $R_1$  of the fore wing. Moreover,  $R_s$  and  $M$  of fore wing is connected by a cross vein in the case of the latter specimen, while in the specimen shown in fig. 5B these veins are apparently connected directly in a single point (CUMMING & LE TRIANT cited above). Therefore, the variability seems to be worth mentioning nevertheless, even in the case of the illustrated paratype specimens of *H. morganae*.

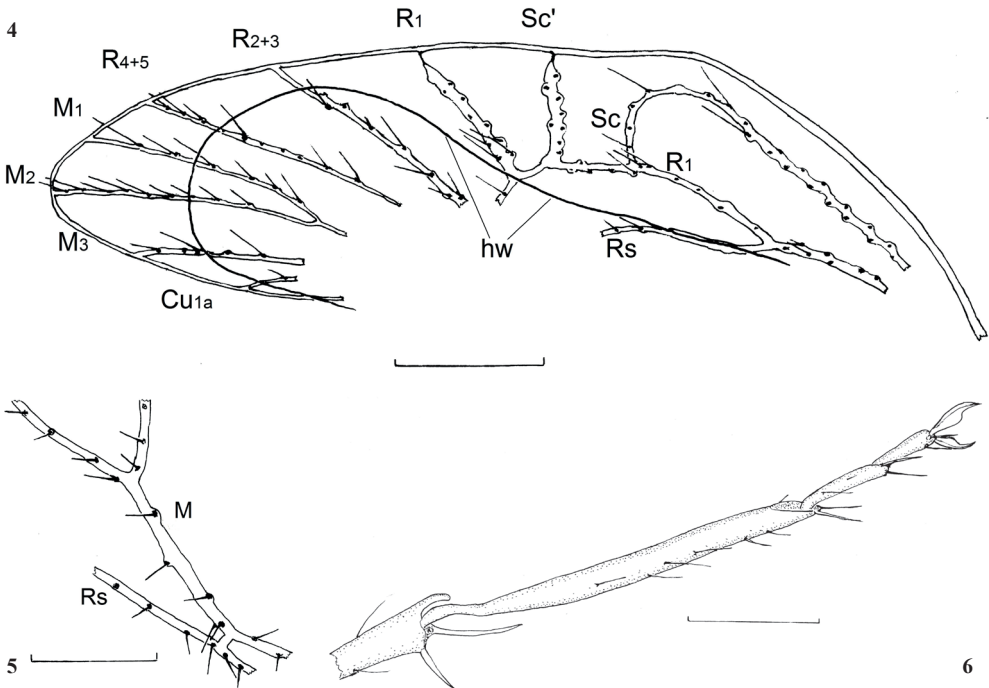


**Figs 1–3.** *Heliadesdakruon morganae* (?) specimen (Savaria Museum). Fig. 1 = habitus; Fig. 2 = details of the right fore wing; Fig. 3 = caudal part of abdomen and distal parts of wings. Abbreviation apart from the wing venation: ev = external valvulae (photos: 1 – A. Á. Somogyi; 2, 3 – B. Schlitt)

The question whether the examined specimen, the paratype specimens without merger of  $M$  and  $R_s$  for a considerable distance and the holotype of *H. morganae* belong to the same variable species, or they are representatives of two or perhaps three different species seems to be open. Investigation of more material (first of all reinvestigation of paratypes of *H. morganae*) would be necessary for a correct answer.

Because of one of the alterations discussed above, a slight modification in description of the genus *Heliadesdakruon* is needed. Namely: instead of the distinctive feature: „seven angled shape” of distal closed cell, „longitudinal veins M and Rs may be fused for a considerable distance, or connected by a short cross vein or directly in a single point” should be written.

As the systematic position of *Heliadesdakruon* regards, it was placed in the family Archaeatropidae, and through the separate origin of Sc' (consequently seven angled distal closed cell) *Archaeatrops* Baz & Ortuño, 2000, while through the acutely angled position of the vein between the two closed cells (i.e.: basal part of Rs meet M in an acute angle) and the setation of the anal area *Bcharregalis* Azar & Nel, 2004 were taken into consideration in the differentiation of the new taxon. However, the genus *Preempheria* Baz & Ortuño, 2001 obtains all of the above mentioned similarities jointly. Moreover, the lack of the nodulus in the fore wing and the paddle-shaped hind wing (BAZ & ORTUÑO 2001, CUMMING & LE TRIANT 2021: fig. 1F) are further shared features of *Heliadesdakruon* and *Preempheria*. Therefore, *Preempheria* should be regarded as closest relative of *Heliadesdakruon*, notwithstanding that these two genera were placed into (slightly supported) different clades in a phylogenetic analysis (ÁLVAREZ-PARRA *et al.* 2024). Consequently, the correct place of the genus *Heliadesdakruon* is in the family Empheriidae, independently of the acceptance or refusal the recent synonymization of Archaeatropidae with Empheriidae (LI *et al.* 2022).



**Figs 4–6.** *Heliadesdakruon morganae* (?) specimen (Savaria Museum). Fig. 4 = visible parts of right fore wing and outline of right hind wing (scale: 0.32 mm); Fig. 5 = left fore wing, connection of the veins Rs and M (scale: 0.06 mm); Fig. 6 = left third leg, tarsus and end of tibia (scale 0.06 mm).

Abbreviation apart from the wing venation: hw = hind wing

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