C. R. Palevol xxx (2017) xxx–xxx

Contents lists available at ScienceDirect

Comptes Rendus Palevol

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General Palaeontology, Systematics, and Evolution

A new genus and species of the subfamily Pemphredoninae (Hymenoptera: Crabronidae) in Upper Cretaceous amber from Myanmar

Un nouveau genre et une nouvelle espèce de la sous-famille Pemphredoninae (Hymenoptera : Crabronidae) de l'ambre Crétacé supérieur de Birmanie

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ARTICLE INFO

Article history:
Received 1st June 2016
Accepted after revision 24 October 2017
Available online xxx

Handled by Annalisa Ferretti

Keywords:
Burmese amber
Taxonomy
Cenomanian
Pemphredonini
Spilomenina

Mots clés :
Ambre birman
Taxonomie
Cénomanien
Pemphredonini
Spilomenina

ABSTRACT

A new genus and species from the subfamily Pemphredoninae (Hymenoptera: Crabronidae) is described from the Upper Cretaceous amber of Myanmar, commonly known as Burmese amber. A complete, illustrated description is provided. *Colmepsiterona cumcarena* n. gen. et sp. represents the third record of the subfamily in the deposit, as well as the tenth of the family Crabronidae in Mesozoic. This taxon is morphologically close to *Cretospilomena familiaris*, previously described in the same deposit. However, although numerous features are shared, a number of unique features justify the proposition of a new genus. The co-occurrence of three specimens belonging to the same taxon could be interpreted as an example of a social behavior, compact nesting behavior, or possibly a sexual congregation.

RÉSUMÉ

Un nouveau genre et une nouvelle espèce de la sous-famille Pemphredoninae (Hymenoptera : Crabronidae) sont décrits dans l'ambre de Birmanie du Crétacé supérieur. Une description complète et illustrée est fournie. *Colmepsiterona cumcarena* gen. et sp. nov. représente le troisième enregistrement fossile de la sous-famille dans le gisement ainsi que le dixième de la famille Crabronidae au Mésozoïque. Ce taxon est morphologiquement proche de *Cretospilomena familiaris*, précédemment décrit dans le même gisement. Cependant, bien que de nombreux caractères soient partagés, un certain nombre de caractères uniques justifient l'établissement d'un nouveau genre. La co-occurrence de trois spécimens de même affinité taxonomique pourrait être interprétée comme la manifestation d'un comportement social, de nidification compacte, ou bien encore de regroupement sexuel.

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https://doi.org/10.1016/j.crpv.2017.10.004
1631-0683/

Please cite this article in press as: Cockx, P.F.D., McKellar, R.C., A new genus and species of the subfamily Pemphredoninae (Hymenoptera: Crabronidae) in Upper Cretaceous amber from Myanmar. C. R. Palevol (2017), https://doi.org/10.1016/j.crpv.2017.10.004

1. Introduction

The subfamily Pemphredonidae is composed of medium-sized to tiny wasps and is one of the most generalized taxa of the family Crabronidae. The subfamily is widespread: records have been reported from all continents except Antarctica, and nearly all members of the subfamily are solitary wasps (Kim and Yang, 2010). Their typical prey items belong to various hexapod taxa such as Auchenorryncha, Sternorryncha, Thysanoptera, or Collembola (Bohart and Menke, 1976). They are abundant in terrestrial habitats and show various nesting tactics (Bennett et al., 2014).

Sixteen fossil genera of Pemphredroninae have been reported from Upper Cretaceous ambers of Siberia, Vendée (France), Canada, Myanmar and New Jersey (Antropov, 2000a, 2000b, 2011; Bennett et al., 2014; Budrys, 1993; Evans, 1969, 1973), middle Eocene Saxonian amber (Ohl and Bennett, 2009), and Eocene Baltic and Rovno ambers (Antropov and Perkovsky, 2009; Budrys, 1993; Sorg, 1986). A few descriptions have been made also from compression fossils (Antropov et al., 2014; Zhang, 1989). Most of these genera are highly specialized forms (Antropov, 2011). Herein, we report the discovery of a new genus and species from Cretaceous Burmese amber. This discovery adds a tenth genus and species to our knowledge of the family Crabronidae in the Mesozoic, and it is the third taxon belonging to Pemphredoninae recovered from the deposit.

Burmese amber (from northern Myanmar) is considered as one of the most important deposits for studying terrestrial diversity around the boundary between the Lower and Upper Cretaceous (Ross et al., 2010). This deposit has been known for nearly 2000 years, and for centuries, was traded in China (Ross et al., 2010). It is rich in diverse insect inclusions, but plants and molds were also found. Only amber from Hukawng valley (northern Myanmar) was traded extensively, this material is often referred to as "Burmese amber"; the main source for this material being the site of the *Noije Bum* hill. Amber comes from the finer grained facies: clastic stones from sandstone to shale. Uranium-Lead radiometric dates obtained from zircons more accurately established the deposit age of the amber: 98.8 Ma (± 0.62), or Upper Albian to Lower Cenomanian (Shi et al., 2012).

2. Material and methods

This study was based on three specimens deposited in the Royal Saskatchewan Museum, Regina, Canada. The specimens originated from a single piece of amber. This piece was cut into two parts to separate the inclusions and thus, facilitate study. The preparation followed the methods established by Nascimbene and Silverstein (2000) for the preparation of fragile amber. Specimens were embedded in mineralogical-grade epoxy (Epotek-301) using a vacuum chamber, then cut and polished to remove excess material and provide clear views. Observations were made using a stereomicroscope (Leica MZ12.5) and a compound microscope (Olympus CH30), while photographs were obtained using a Visionary Digital macrophotography station (a Canon EOS 5D DSLR camera equipped with a Canon MP-E-65 mm lens, on a motorized stand). Pictures were taken at various focal lengths and combined using Helicon Focus software in order to provide increased depth of field in the resulting images. Specimen illustrations were completed with a graphic tablet utilizing Sketchbook Pro and Adobe Photoshop software; this allowed us to trace anatomical features directly from specimen photographs.

All measurements are given in millimetres and were obtained with an ocular micrometre. Abbreviation include: RSM: Royal Saskatchewan Museum, Regina, Canada; HL: Head Length; HW: Head Width; MsL: Mesosomal Length; FWL: Forewing Length; MtL: Metasomal Length; PBL: Preserved Body Length. Notations include: first flagellomere and tarsomere are written FI and tarsomere I; second, FII and tarsomere II, etc.

3. Systematic Palaeontology

Superfamily Apoidea Latreille, 1802
Family Crabronidae Latreille, 1802
Subfamily Pemphredoninae Dahlbom, 1835
Tribe Pemphredonini Dahlbom, 1835

Genus *Colmepsiterona*

Type of species. *Colmepsiterona cumcarena*, by original designation.

Diagnosis. Scapal basin broad (nearly one-third of head width) and tall (extending along most of height of compound eyes). Mesosoma with faint parapsidal lines. Propodeum minutely punctured with three pairs of dorsal longitudinal ridges (submedian, sublateral, lateral) and posterolateral horizontal spines; lateral carina bears row of foveae along lateral margin. Forewing venation with basal M, m-Cu and 2-Cu curved.

Remarks. The specimens described are close to the genus *Cretospilomena* Antropov, 2000 (this is suggested by a few characteristic features, particularly those related to the propodeum and the general pattern of the forewing venation). However, numerous characters (forewing proportions, palpal formula, etc.) are different, leading us to define a new genus. We can be relatively confident in our taxonomic placement, because the amber piece appears to contain both male and female members of the species. One of the specimens has twelve antennal segments and an exposed ovipositor tip, whereas the other two specimens have eleven antennal segments and lack exposed genitalia. This difference is probably due to sexual dimorphism, with one female and two males.

Etymology. The genus name is an anagram of the genus *Cretospilomena*, which shares many morphological similarities, and was previously described in the same deposit (Antropov, 2000a).

C. cumcarena new species
(Figs. 1 and 2)

Material examined. Holotype, RSM inclusion number P3306.004a (anteriormost female in amber piece that also contains P3306.004b) from Upper Cretaceous Burmese amber. Two paratype inclusions (both probably males) numbered P3306.004b (posteriormost specimen in amber

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