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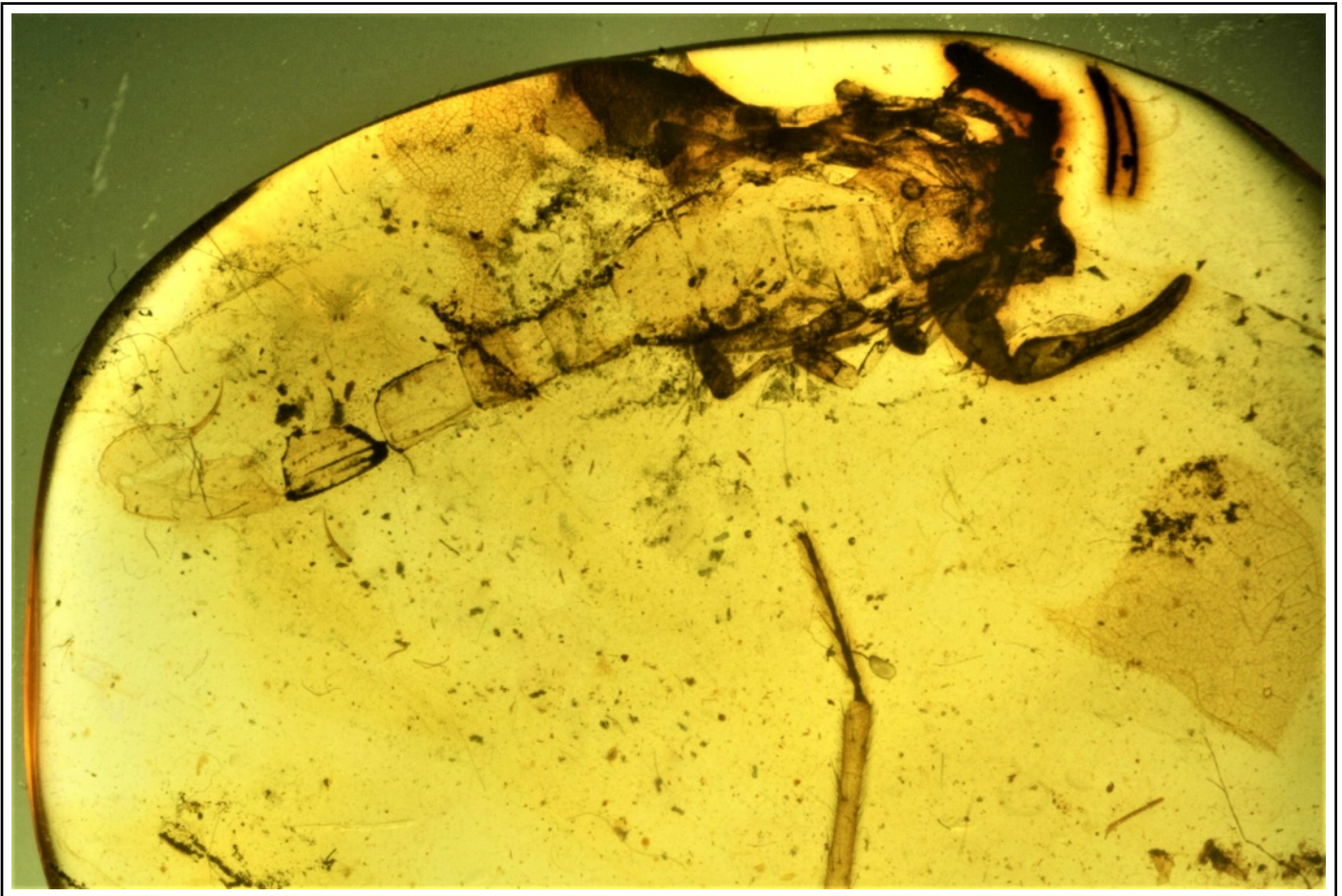
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Confirmation of the validity of the genus *Cretaceousbuthus* Lourenço, 2022 and description of a new species from Burmite (Scorpiones: Buthoidea: Buthidae)

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variability;
new species;
description;
fossil;
Burmite.

Abstract. – The study of new scorpion specimens from Cretaceous Burmite leads to the descriptions of a new species which once again can be associated to the buthoid lineage and to the family Buthidae. With this description the validity of the genus *Cretaceousbuthus* is confirmed. The new species shows quite distinct characters, particularly a telson with a conical-shaped sub-aculear tooth. The discovery of this new element confirms, once again, the existence of an important diversity within the Burmite fauna. The validity of one previously described species is also confirmed: *Chaerilobuthus schwarzi* Lourenço, 2015 (Family Chaerilobuthidae).

Lourenço W. R. & Velten J., 2023. – Confirmation of the validity of the genus *Cretaceousbuthus* Lourenço, 2022 and description of a new species from Burmite (Scorpiones: Buthoidea: Buthidae). *Faunitaxys*, 11(35): 1 – 6.

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Introduction

Among the fossil arthropods found in amber, scorpions still remain rare. However, more and more specimens from Burmite are presently becoming available leading to new studies which are bringing a global view about this Cretaceous scorpion fauna (e. g. Lourenço, 2016a; Lourenço & Velten, 2022a,b,c).

After the clarification of the familial status of the genera *Palaeoburmesebuthus* and *Betaburmesebuthus* these lineages were placed in their own family Palaeoburmesebuthidae. A third genus was subsequently added to this family, *Spinoburmesebuthus* Lourenço, 2017. The validity of this last genus was however questioned by Xuan et al. (2023) based on some speculative and erroneous evidence, published in an article manifestly not peer-reviewed consequently, the genus *Spinoburmesebuthus* is revalidated at present. This point and other similar subjects will be treated more in detail in a coming global publication (Lourenço, in preparation). The association of the new family to buthoids was clearly confirmed following the discovery of several well-preserved specimens which revealed common characters with the buthoids, such as their trichobothrial patterns, which are almost identical to those of most extant buthoids (e.g., Lourenço, 2016a, 2018a; Lourenço & Beigel, 2015). More remarkable was the proposition of a new genus *Archaeoananteroides* Lourenço, 2016 clearly associated to buthids, followed by a

second genus, *Cretaceousbuthus* Lourenço, 2022 (Lourenço & Velten, 2016, 2022b).

Previously to these new insights, the Lebanon amber family Archaeobuthidae Lourenço, 2001 (Lourenço, 2001) was excluded from buthoids by a number of authors (e.g., Baptista et al. 2006; Riquelme et al. 2015). In definitive, the existence of buthoid elements during the Cretaceous is often rejected, mainly based on theoretical speculation or ‘recommendations’ (Santiago-Blay et al., 2022) which sound more like a form of pontification. This aspect of the problem will equally be treated in the coming global analysis (Lourenço, in preparation). It is well known that both higher classification of scorpion in general and the classification of fossils in particular often present controversial issues, which have been largely debated among scorpion taxonomists, especially during the last 20 years. Nevertheless, this debate is far from being closed since there is no final evidence allowing the inclusion or the exclusion of a given fossil to the Buthoidea lineage.

More attention should rather be given to the increased pace of new descriptions, when produced by weakly-qualified scorpion taxonomists (Xuan et al., 2022, 2023). These will certainly bring more and more problems for future identifications, since many species found in Burmese amber show close morphologies. Consequently, when an increasing number of specimens are discovered for a given group, the quality of the pieces required to justify new description necessarily needs to be higher (Lourenço,

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2015a, 2016a,b, 2018b, 2021; Lourenço & Velten, 2021, 2022a,b,c). Moreover, precise new descriptions also imply a good knowledge of most, if not all, Burmite fossil scorpions previously described. Only this form of procedure can authorise new descriptions without the risk of misidentifications (Lourenço, 2016a,b, 2018a,b, 2021; Lourenço & Velten, 2021, 2022a,b,c).

In the present contribution two new scorpion specimens are studied; one represents a species previously described, comforting therefore its status. The second scorpion is represented by an almost complete specimen, presenting quite unique characters, leading to the description of a new species, placed in the genus *Cretaceousbuthus* Lourenço, confirming therefore the validity of this buthid genus among those found in Burmite. Once again, the considerable degree of scorpion diversity in the Burmese amber-producing forests is confirmed.

Material and methods

The specimens investigated are preserved in more or less clear pieces of pale yellow to reddish-yellow resin. More details are proposed before each taxonomic treatment. The scorpion representing the new species is not totally complete; it represents in fact an exuvia and some parts (one pedipalp, legs and most sternites) are destroyed and some sternites have been dislocated during the process of recovering by the resin. Nevertheless, the resin is rather pale and largely translucent, therefore many characters are clearly visible, even by transparency. Only the presence of a dark, sort of ‘black sand’ prevents the full observation of some regions such as the chelicerae, carapace and pedipalps. The schematic drawings provided are an interpretation of what was observable. Illustrations and measurements were produced with the aid of a Wild M5 stereomicroscope and a Leica microscope DMLB, both equipped with a drawing tube (camera lucida) and an ocular micrometre. Measurements follow Stahnke (1970) and are given in mm. Trichobothrial notations are those of Vachon (1974, 1975). Other morphological terminologies mostly follow Hjelle (1990). Trichobothria are definitely recorded when their bothria (areoles) can be observed; nevertheless, some trichobothria can be deduced through the observation of thin hairs. Considering the morphologies of pedipalp and pectines the scorpion is probably a female; since the specimen is an exuvia, it probably represents a pre-adult or a juvenile.

Taxonomic treatment

Superfamily **Buthoidea** C. L. Koch, 1837

Family **Buthidae** C. L. Koch, 1837
(Assignment requiring further investigation)

Genus *Cretaceousbuthus* Lourenço, 2022

The choice of the genus *Cretaceousbuthus* to place the new species

The general morphology of the new scorpion is globally similar to that of some genera of extant buthoid scorpions, but also with that of two genera of buthids previously found in Burmite, namely *Archaeoananteroides* Lourenço, 2016 and *Cretaceousbuthus* Lourenço, 2022 (Lourenço & Velten, 2016, 2022b). Even if a number of characters remain unknown for these two genera, such as the morphology of the telson, precise chela's trichobothrial pattern, cheliceral structure etc, others are similar to what was observed for both these genera. In account of some similitudes and differences, it appears preferable to associate the new species to the genus

Cretaceousbuthus instead of creating a further new genus. Some presently observed characters can however, be used to confirm and complete the diagnose of *Cretaceousbuthus* as follows: a possible large overall size with an estimated total length ranging from 40 to 60 mm (see measurements after the description). Specimens rather bulk with short pedipalps. Anterior margin of carapace with a deep concavity. Two large median eyes and three pairs of lateral eyes. Sternum sub-pentagonal to almost triangular. Tergites with one median carinae; lateral carinae inconspicuous. Metasomal segments rounded and with possibly 10 carinae on I to IV; at least confirmed on IV (Fig. 5, 12). Telson pear-like shaped with a conical sub-aculear tooth (Fig. 5), recalling the one observed for the extant genus *Buthoeloides*, Hirst, 1925 (Lourenço, 2013). Chela fingers with 10-11 rows of small granules, separated by bigger central accessory granules. Trichobothrial pattern similar to that of extant buthid type A (Vachon 1974); the dorsal trichobothria of femur presenting a beta disposition (Vachon, 1975). Femur orthobothriotaxic with 4 internal, 5 dorsal and 2 external. Patella minorante neobothriotaxic with 1 internal, dorsal **d₁** and **d₂**, but absence of **d₃**, **d₄** and **d₅** or only **d₄**; a number of external trichobothria can be observed; ventral trichobothria absent. Chela with at least four trichobothria on fixed finger, **dt**, **db**, **esb** and **eb** and one in the hand, possibly **Esb**. Chelicera with a similar dentition of that defined for buthids (Vachon, 1963); two small basal teeth on fixed and movable fingers.

Cretaceousbuthus petersi Lourenço, 2023 sp. n.

(Fig. 1-13)

ZooBank: <http://zoobank.org/DB872688-92C1-4D43-AE5F-E5EB3A9D7ABF>

Holotype. Possibly a female, pre-adult or a juvenile depending on the number of molts yet necessary to reach adult stage. The scorpion is represented by an exuvia, incomplete but rather well preserved in a clear block of pale-yellow amber measuring 0.5 x 7.5 x 1.0 mm. A great number of inclusions are also present, represented by some vegetal debris and particularly some type of ‘black sand’ which largely covers the carapace, chelicerae and pedipalps. An insect leg is also included in the piece.

Diagnosis for the new species. – Having in account that the specimen is a juvenile exuvia, the overall size of 16.9 mm is rather large when compared to other scorpions previously found in Burmite; an estimated total length could range from 40 to 50 mm. Specimen rather bulk with short pedipalps. Carapace moderately granulated; anterior margin with a deep concavity. Median eyes large and anterior to the centre of the carapace; three pairs of conspicuous lateral eyes. Sternum sub-pentagonal to almost triangular. Sternites are largely destroyed, but one spiracle apparently is small and slit-like to oval. Metasomal segments I to IV apparently with with 10 carinae; this is at least confirmed for IV (Fig. 5). Telson pear-like shaped with a conical sub-aculear tooth. Trichobothrial pattern similar to that of extant buthid type A (Vachon 1974); the dorsal trichobothria of femur presenting a beta disposition (Vachon, 1975). Femur orthobothriotaxic with 4 internal, 5 dorsal and 2 external. **d₅** and **e₁** not in the same position. Patella minorante neobothriotaxic with 1 internal, dorsal **d₁** and **d₂**, **d₃** and **d₅**; absence of **d₄**; a number of external trichobothria can be observed; ventral trichobothria absent. Chela with at least four trichobothria on fixed finger, **dt**, **db**, **esb** and **eb** and one in the hand, possibly **Esb**. Tibial spurs present on legs III and IV, small in size. Pedal spurs present in all legs.

Type locality and horizon. – Myanmar (Burma), Kachin; precise locality unknown; Lower Cretaceous.

Patronym. – The specific name honors Mr Thorsten Peters, Gelsenkirchen, Germany, who supported the present study.

Depository. - The type specimen is deposited in the collections of Mr Thorsten Peters, Gelsenkirchen, Germany.

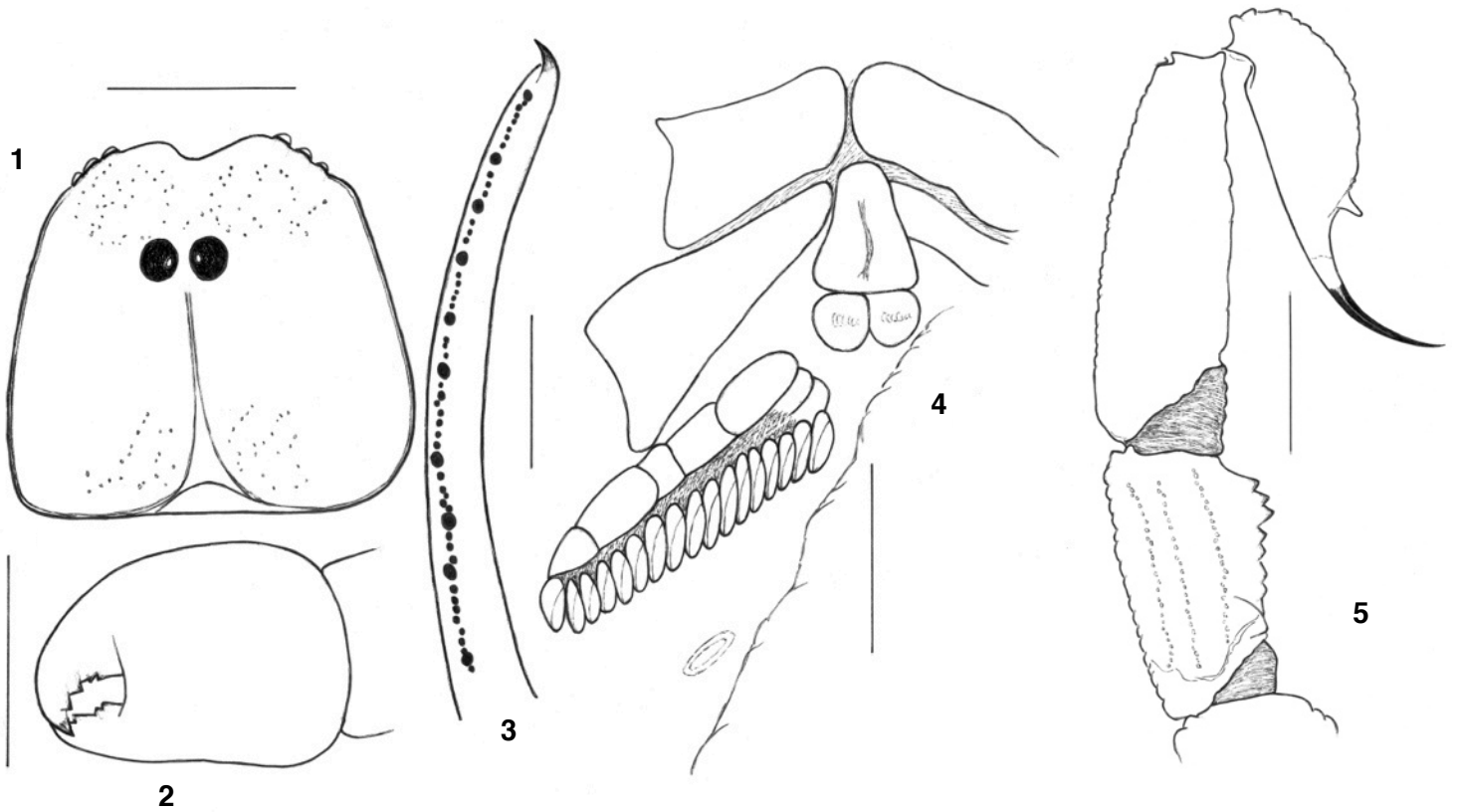
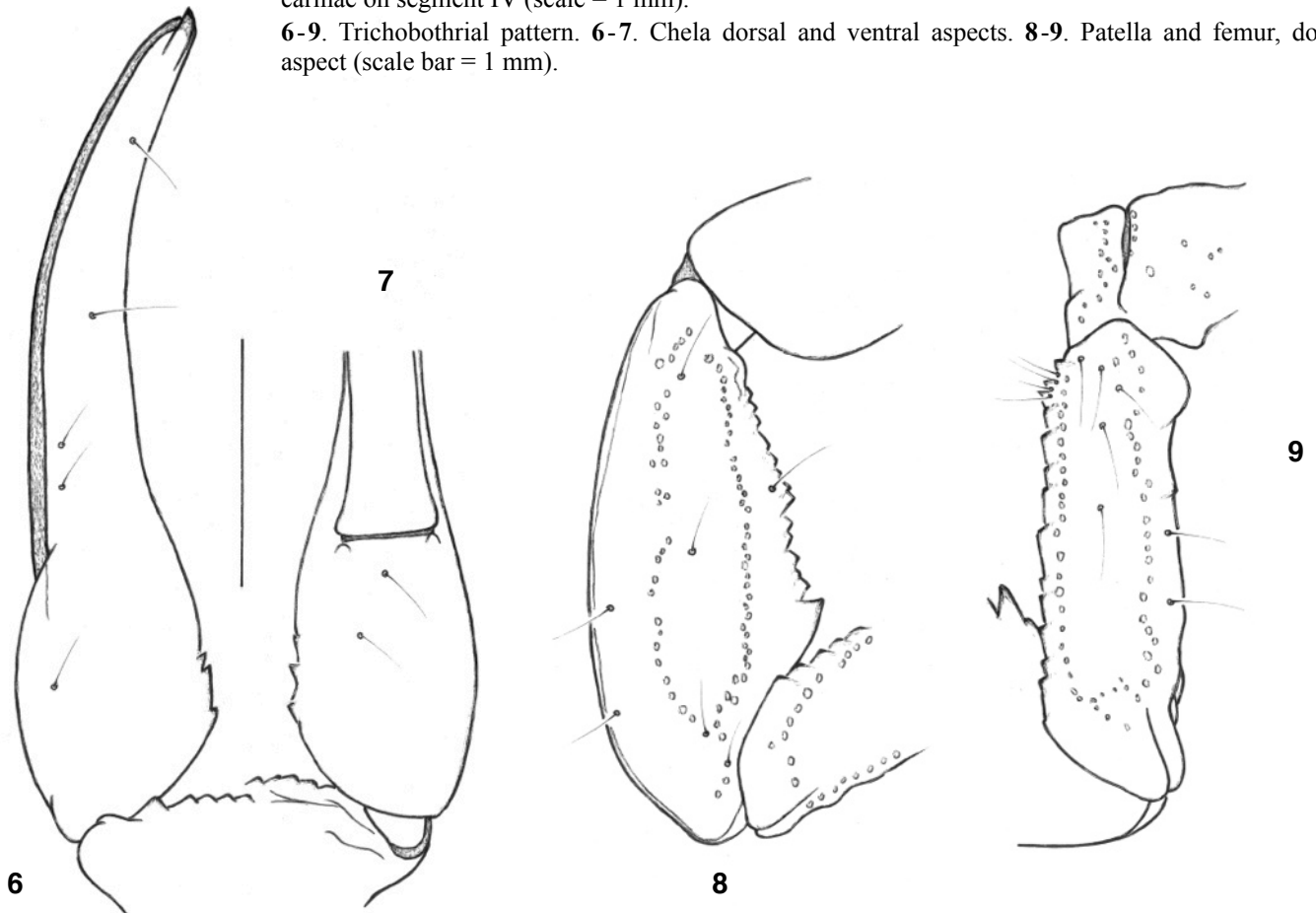


Fig. 1-9. *Cretaceousbuthus petersi* Lourenço, 2023 sp. n., ♀ holotype.

1. Carapace. 2. Chelicera, dorsal aspect. 3. Fixed finger, showing the rows of granules. 4. Ventral aspect showing coxapophysis, sternum, genital operculum, one pecten and torn sternite III with the vestige of a spiracle [scale bars = 1 mm (1, 4), 0.5 mm (2, 3)].

5. Metasomal segments IV, V and telson, lateral aspect, showing the conical sub-aculear tooth and 10 carinae on segment IV (scale = 1 mm).

6-9. Trichobothrial pattern. 6-7. Chela dorsal and ventral aspects. 8-9. Patella and femur, dorsal aspect (scale bar = 1 mm).



Description

Coloration. – The scorpion is yellow to pale yellow with some reddish zones on carapace and pedipalps; actually, the exuviae is embedded in a rather clear amber resin, consequently, some parts are translucent allowing even observations by transparency. Only the areas covered by the black dust prevent a good observation.

Morphology. – Carapace moderately granular, mostly in the anterior region; anterior margin with a strong concavity. Carinae inconspicuous; furrows weak. Median ocular tubercle anterior to the centre of the carapace; median eyes large and separated by less than one ocular diameter; three pairs of conspicuous lateral eyes. Sternum subpentagonal to triangular. Genital operculum with two semi-oval to round plates. Mesosomal tergites weakly granular to smooth, with one median carina; lateral carinae, if present, totally inconspicuous; VII with five carinae; the lateral weak and the internal inconspicuous. Pectines large, with 17-? teeth; fulcra absent. Sternites apparently smooth; the ventral side of the exuvia was torn up during the process of trapping; one apparently small slit-like to oval spiracle is poorly observed. Metasomal segments I to IV apparently with 10 carinae; at least on IV these are clearly observed; dorsal carinae with some stronger posterior granules; all segments are rounded, in particular V. Telson pear-like shaped, smooth with one ventral carinae; sub-aculear tooth conical. Chelicera with buthid type dentition (Vachon, 1963); fixed and movable fingers with two small basal teeth. Pedipalp femur pentacarinata; patella with 6-7 carinae; both segments strongly granular; internal face of femur and patella with spinoid granules; chela short and slightly bulk with some moderate carinae; internal face with some spinoid granules; chela fingers with 10-11 rows of small granules, separated by bigger central accessory granules. Trichobothrial pattern similar to the extant buthid type A (Vachon 1974); dorsal trichobothria of femur in beta configuration (Vachon, 1975). See diagnosis for details. Legs tarsi with thin setae forming more or less a brush. Tibial spurs present on legs III and IV, weakly marked; pedal spurs present on legs I-IV weak to moderate in size.

Morphometric values (mm), holotype of *Cretaceousbuthus petersi* Lourenço, 2023 sp. n.

– **Total length** (including telson) 16.9.

– **Carapace**

length, 2.0;
anterior width, 1.4;
posterior width, 2.2.

– **Mesosoma:** length, 4.2.

– **Metasomal segments**

I: length, 1.2; width, 1.3;
II: length, 1.4; width, 1.2;
III: length, 1.5; width, 1.2;
IV: length, 1.8; width, 1.2;
V: length, 2.4; width, 1.0; depth, -.

– **Telson:** length, 2.4; width, -; depth, 0.8.

– **Pedipalp**

femur length, 2.1, width, 0.6;
patella length, 2.2, width, 0.8;
chela length, 3.1, width, 0.7, depth, -;
movable finger length, 2.7.

Other species also examined during this study

Chaerilobuthus schwarzi Lourenço, 2015 (Family Chaerilobuthidae)

A very small juvenile with the following measurements (in mm): total length of 4.16, carapace 0.84, prosoma 0.90, metasoma 1.68, telson 0.74. Specimen included in a clear yellow piece sizing 10.5 x 7.5 x 1 mm. The piece equally contains an insect, a possible nymph of Blattodea, which was trapped near to the scorpion; impossible to suggest if it was a potential prey. The species is clearly characterised by the shape and size of the telson, the size of pectines and number of teeth, 5-4 and the typical carinae on femur, patella and chela of pedipalps (Fig. 14-15).

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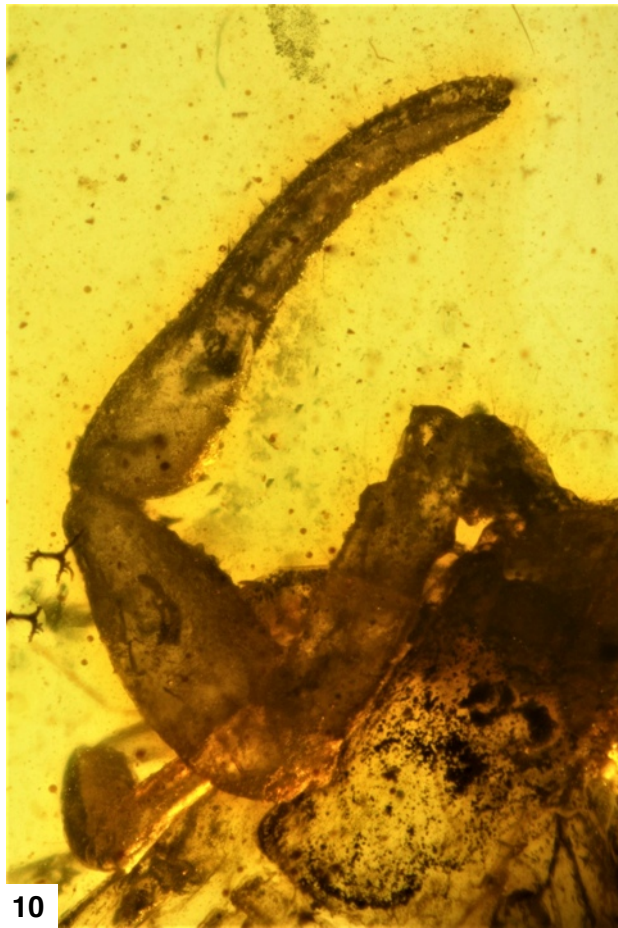
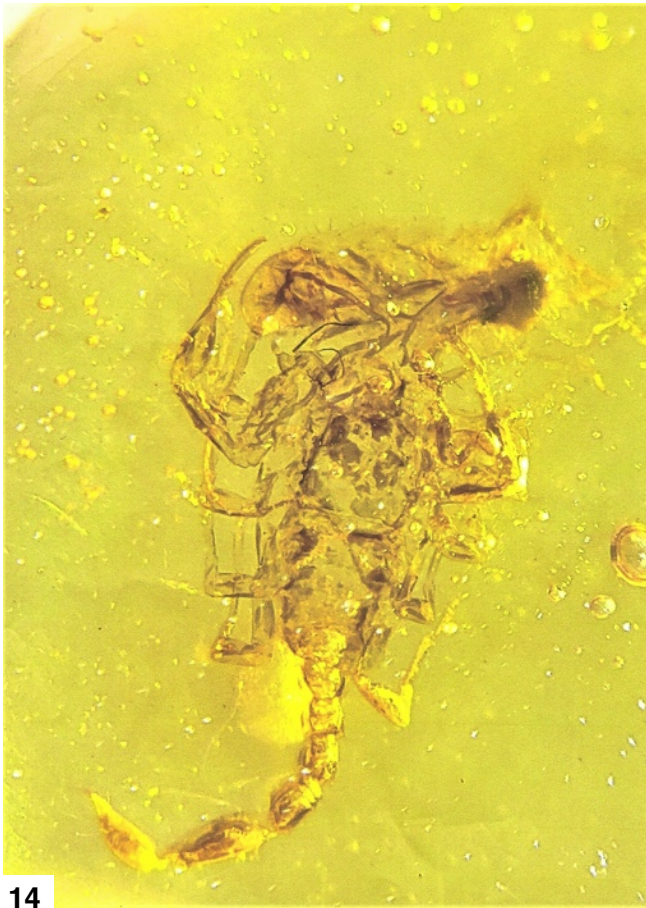


Fig. 10-13. *Cretaceousbuthus petersi* Lourenço, 2023 sp. n., ♀ holotype.

10. Carapace and left pedipalp. **11.** Ventral aspect showing sternum, genital operculum and one pecten.
12. Metasomal segments III-V and telson, lateral aspect. **13.** Legs II-IV.



14



15

Fig. 14-15. *Chaerilobuthus schwarzi* Lourenço, 2015. Habitus of juvenile, dorsal and ventral aspects.

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Authors contribution ¹

Publisher Correspondence. – WL

Writing the article. – WL

Description. – WL

Article proofreading. – WL

Bibliographic work. – WL

Material study. – WL & JV

Author of the figures. – WL (Fig. 1-9) & JV (Fig. 10-15)

Résumé

Lourenço W. R. & Velten J., 2023. – Confirmation de la validité du genre *Cretaceousbuthus* Lourenço, 2022 et description d'une nouvelle espèce pour l'ambre du Myanmar (Scorpiones: Buthoidea: Buthidae). *Faunitaxys*, 11(35): 1-6.

L'étude de nouveaux spécimens de scorpions de l'ambre du Crétacé inférieur du Myanmar conduit à la description d'une nouvelle espèce pouvant, une fois de plus, être associée à la lignée des Buthoidea ainsi qu'à la famille des Buthidae. La nouvelle espèce présente également des caractères très distincts, notamment un telson avec une épine sous-aiguillonnaire de forme conique. La découverte de ce nouvel élément confirme une fois de plus, l'existence d'une importante diversité au sein de la faune trouvée dans l'ambre Crétacé du Myanmar. La validité d'une espèce préalablement décrite est également confirmée : *Chaerilobuthus schwarzi* Lourenço, 2015 (Famille Chaerilobuthidae).

Mots-clés. – Scorpiones, Buthidae, *Cretaceousbuthus*, *petersi*, taxonomie, morphologie, variabilité, nouvelle espèce, description, fossile, Ambre Birman.

¹ WL = Wilson R. Lourenço - JV = Jürgen Velten

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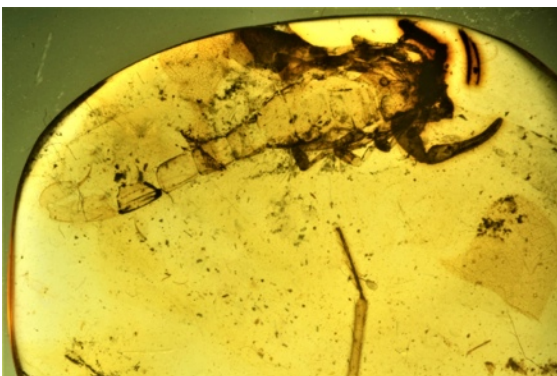


Illustration de la couverture :

Cretaceousbuthus petersi Lourenço sp. n.

Crédits:

Wilson R. Lourenço: Fig. 1-9.

Jürgen Velten: Fig. 10-15 & couverture.