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A new species of *Buthacus* Birula, 1908 from Western Algeria (Scorpiones: Buthidae)

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Algeria.

Abstract. – A new species of *Buthacus* Birula, 1908 is described on the basis of one adult male specimen collected in Tindouf, Western Algeria. The new species is mainly characterized by a yellowish coloration without any spots, long pectines with marginal tips extending to the end of sternite V, a very long and curved telson aculeus, chela fingers almost straight with 9 and 10 rows of granules on fixed and movable fingers, respectively, external accessory granules moderate to strong, and tibial spurs moderate on leg III, long on leg IV. This new taxon belongs to the *Buthacus leptochelys* (Ehrenberg 1829) complex of species and represents the 10th known *Buthacus* species reported from Algeria. The new species is compared with the six other species of the “*leptochelys*” complex occurring in the region covering Western Algeria, Northern Mauritania, Northern Western Sahara and Morocco, namely *B. occidentalis* Vachon, 1953, *B. stockmanni* Kovařík, Lowe & Štáhlavský, 2016, *B. zieglerei* Lourenço, 2000, *B. mahraouii* Lourenço, 2004, *B. maroccanus* Lourenço, 2006 and *B. algerianus* Lourenço, 2006, the three last species being confirmed again as valid species.

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Introduction

The genus *Buthacus* was created by Birula (1908) as a subgenus of *Buthus* Leach, 1815, having as its type species *Buthus leptochelys* (Ehrenberg 1829), described from Sinai (Palestine) as *Androctonus (Leiurus) leptochelys*. Since its creation, *Buthacus* has been considered either as a subgenus or as a genus by different authors and was finally defined as a valid genus (related to *Buthus*) by Vachon (1949, 1952), who also drew the attention to the extreme complexity of this genus, and notably to the fact that *Buthacus leptochelys* and *Buthacus arenicola* (Simon, 1885) could represent two complexes of forms or species, rather than individual species. This fact was later confirmed by Levy & Amitai (1980) who attempted to divide the genus *Buthacus* in two species groups mainly based on the structure of the dentition of the movable finger, *i.e.* species bearing a complete, or almost complete, series of external accessory granules (*B. leptochelys* group) and species with all or most of the external accessory granules absent (*B. arenicola* group).

Recent discovery in the collections of the Musée d’Histoire Naturelle de Lyon, France (MHNL) of a specimen collected in Tindouf, in the extreme West of Algeria, close to the Morocco border, has led to the description of another new species of *Buthacus* from the core Saharan region. This new taxon is associated with the *Buthacus leptochelys* complex of species and represents the 10th known *Buthacus* species reported from Algeria, attesting again to a considerable degree of scorpion diversity found in the Algerian Saharan desert (*e.g.* Lourenço & Sadine, 2014;

Lourenço *et al.*, 2017; Sadine *et al.* 2020; Ythier *et al.*, 2021; Bengaid *et al.*, 2022), and that our knowledge of this fauna is still far from complete, with many additional species and probably even genera awaiting discovery, notably in regions not easily accessible, like *e.g.* the region of Tindouf where the new species was collected.

The new species is compared with the six other species of the “*leptochelys*” complex occurring in the region covering Western Algeria, Northern Mauritania, Northern Western Sahara and Morocco, namely *B. occidentalis* Vachon, 1953, *B. zieglerei* Lourenço, 2000, *B. mahraouii* Lourenço, 2004, *B. algerianus* Lourenço, 2006, *B. maroccanus* Lourenço, 2006 and *B. stockmanni* Kovařík, Lowe & Štáhlavský, 2016.

In addition, *B. mahraouii* and *B. algerianus* (originally described as *B. leptochelys algerianus*), previously synonymized with *B. zieglerei* (Kovařík *et al.*, 2016) then restored as valid species (Lourenço, 2017), but still indicated as synonyms of *B. zieglerei* in a list of *Buthacus* species, subspecies and synonyms in Cain *et al.* (2021), are herewith confirmed again as valid species, based on morphological differences (see comparisons and key to species in this work) as well as disjointed pattern of geographical distributions in a very complex environment leading to a high degree of micro-endemism (see relief map in Fig. 10). Finally, the species status of *B. maroccanus*, originally described as *B. arenicola maroccanus* then raised to species (Lourenço, 2017), but still listed as a subspecies of *B. arenicola* in Cain *et al.* (2021), is herewith confirmed again. The species is valid based on morphological features and disjointed pattern of geographical distribution (see comparisons, key and Fig. 10 below), and belongs to the “*leptochelys*” complex (chela finger external accessory granules extremely reduced but still present).

Reviewer:

Gérard Dupré (France). <http://zoobank.org/B3DFB480-9253-4C7C-80EC-FCD7310DFD78>



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Methods

Illustrations and measurements were made with the aid of a Motic SMZ-1713 stereo-microscope with an ocular micrometer, together with a digital camera Tucsen HD Lite, a Canon EOS 7D camera and a Wacom Intuos drawing tablet. Map was made using maps-for-free.com and Adobe Photoshop software. Measurements follow Stahnke (1971) and are given in mm. Trichobothrial notations follow Vachon (1974) and morphological terminology mostly follows Vachon (1952) and Hjelle (1990). Type material studied herein is deposited in the MHNL (Musée d'Histoire Naturelle de Lyon (Musée des Confluences), CCEC, Lyon, France).

Composition of the genus *Buthacus* in Algeria (in order of description)

- *Buthacus arenicola* (Simon, 1885)
- *Buthacus foleyi* Vachon, 1948
- *Buthacus algerianus* Lourenço, 2006
- *Buthacus birulai* Lourenço, 2006
- *Buthacus armasi* Lourenço, 2013
- *Buthacus samiae* Lourenço & Sadine, 2015
- *Buthacus spinatus* Lourenço, Bissati & Sadine, 2016
- *Buthacus elmenia* Lourenço & Sadine, 2017
- *Buthacus ahaggar* Lourenço, Kourim & Sadine, 2017
- *Buthacus sadinei* sp. n.

Taxonomic treatment

Family **Buthidae** C. L. Koch, 1837

Genus *Buthacus* Birula, 1908

Buthacus sadinei sp. n.

(Fig. 1-9)

ZooBank: <http://zoobank.org/87AE7069-56FC-49F5-9E4F-3AFB379D2BDC>

Holotype, ♂, Algeria, Sahara, Tindouf, IV/1971 (D. Louis), D. Bruno & D. Jean-Marc leg., 2005 (No. 2005.60), deposited in the MHNL (47023175).

Etymology. – Patronym in honour of Dr. Salah Eddine Sadine, Ghardaïa, Algeria, for his contributions to the study of scorpions from Algeria.

Diagnosis. – Scorpions of moderate size with a total length of 56.2 mm for the male holotype. General coloration yellowish without any spots. Male pectines long with the marginal tips extending to the end of sternite V; pectinal tooth count 29-30. Metasomal segment I with 10 complete carinae, II-IV with 8 complete carinae; segment V with 36 long setae. Telson with aculeus very long and curved. Chela fingers almost straight, with 9 rows of granules on fixed finger, 10 on movable finger; external accessory granules moderate to strong. Tibial spurs moderate on leg III, long on IV. Trichobothriotaxy A-β (beta) orthobothriotaxic.

Description (based on male holotype).

Coloration. – Generally yellowish without any spots or pigmented zones on the body and appendages. Prosoma: carapace yellowish; only the eyes surrounded by black pigment. Mesosoma: yellowish. Metasoma: all segments yellowish. Vesicle yellowish; aculeus yellowish at the base and reddish at its extremity. Venter yellowish; pectines yellowish. Chelicerae yellowish without any reticulation; teeth reddish. Pedipalps: yellowish overall, paler than body; the rows of granules on the dentate margins of the fingers reddish. Legs yellowish, paler than body.



Fig. 1-2. *Buthacus sadinei* sp. n., ♂ holotype, habitus (dried specimen). 1. Dorsal aspect. 2. Ventral aspect.

Morphology. – **Prosoma**: Anterior margin of carapace not emarginate, straight, bearing twelve macrosetae. Carapace carinae weak; anterior median carinae obsolete; central median, posterior median and central lateral carinae weak. All furrows weak to obsolete. Intercarinal spaces moderately to slightly granular. Median ocular tubercle slightly anterior to the centre of the carapace; median eyes separated by about two ocular diameters. Five pairs of lateral eyes; the first three disposed in one line, the fourth and fifth situated behind eye three. **Mesosoma**: Tergites I-VI tricarinate; all carinae weak; lateral carinae vestigial on segment I; tergite VII pentacarinate, with lateral pairs of carinae strong; median carinae present on proximal one-half, moderately marked. Intercarinal spaces with fine granulation in central area of tergites, with coarse and fine granulation on lateral sides. Sternites smooth; all carinae absent from sternites III-VI; sternite VII with two pairs of smooth carinae. Pectines long with the marginal tips of the pectines extending to the end of sternite V; pectinal tooth count 29-30; pectines with 3 marginal lamellae and 8 middle lamellae; lamellae and fulcra with numerous setae. **Metasoma**: Segment I with 10 complete carinae, II-IV with 8 complete carinae (lateromedial carinae on segment II indicated by several granules on posterior part only); ventral carinae weak on segments I-IV; dorsal and dorsolateral carinae with granules slightly spinoid on segments I and II. Segment V with 5 carinae; ventrolateral armed with spinoid granules and several strong spinoid lobes. Dorsal furrows of all segments weakly developed; dorsal and lateral intercarinal spaces smooth on all segments; ventral intercarinal spaces smooth on segments I-IV, weakly granulated on V. Segment V with 36 long setae. Anal arc composed of 12 ventral teeth and two lateral lobes. Telson smooth. Aculeus very long and curved; subaculear tubercle absent. Chelicerae with two reduced but not fused denticles at the base of the movable finger (Vachon, 1963). **Pedipalps**: Trichobothrial pattern orthobothriotaxic, type A (Vachon, 1974); chela fixed finger with trichobothria et situated anteriorly to dt; dorsal trichobothria of femur in β (beta) configuration (Vachon, 1975). Femur pentacarinate; all carinae moderately crenulate. Patella and chela with vestigial carinae only, almost smooth. Chela fingers almost straight, with dentate margins composed of 9 rows of granules on fixed finger, 10 on movable finger; each row with one external and one internal accessory granule, both moderate to strong; 4 terminal granules next two the terminal denticle. **Legs**: Ventral aspect of tarsi with numerous thin long setae. Tibial spurs moderate on leg III, long on IV.

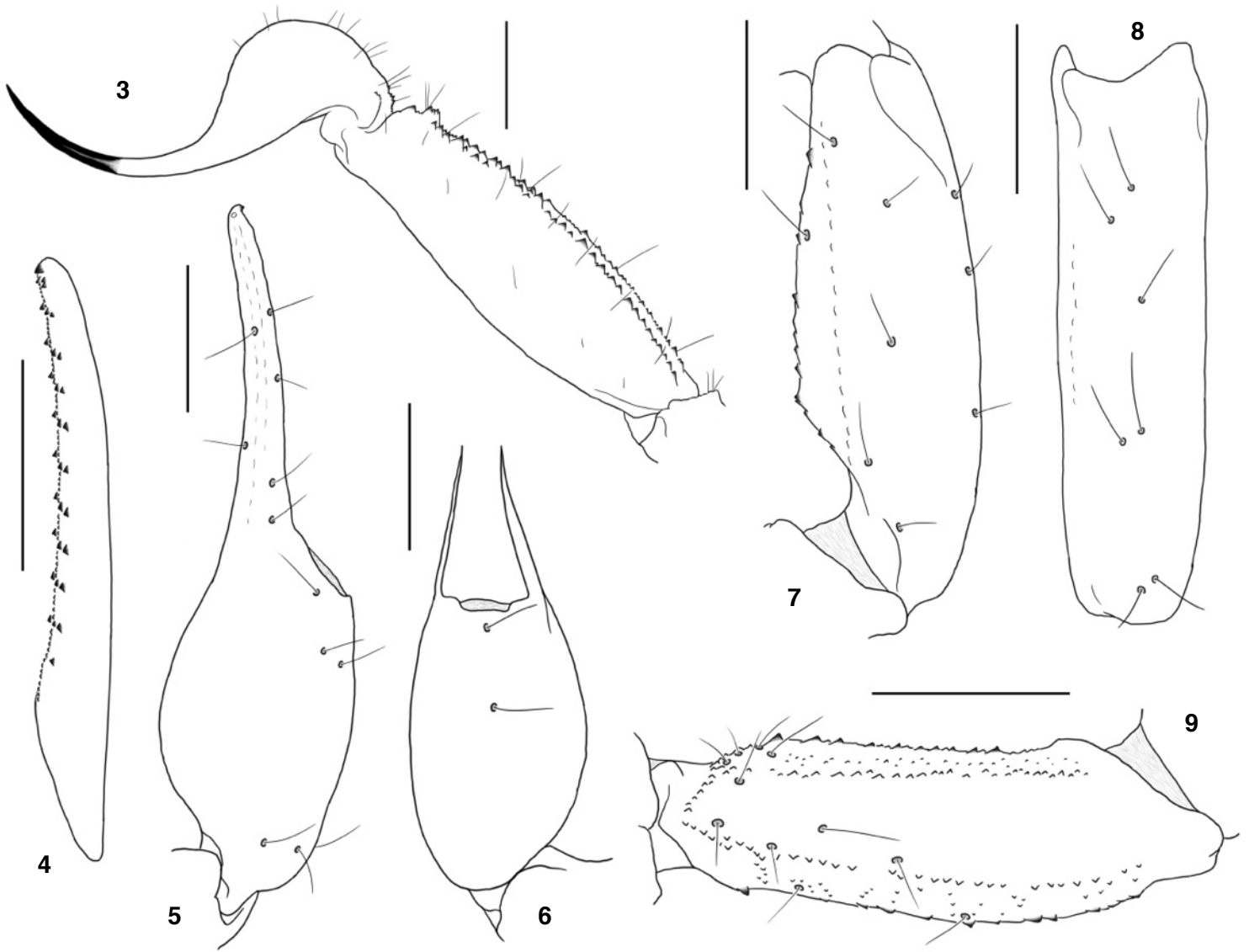


Fig. 3-9. *Buthacus sadinei* sp. n., ♂ holotype (Scale bars = 2 mm).

3. Metasomal segment V and telson, lateral aspect. **4.** Cutting edge of pedipalp chela movable finger with longitudinal series of granules. **5-9.** Trichobotrial pattern. **5.** Chela, dorso-external aspect. **6.** Chela, ventral aspect. **7.** Patella, dorsal aspect. **8.** Patella, external aspect. **9.** Femur, dorsal aspect.

Key to the species of *Buthacus* discussed in this work

1. Tibial spurs of leg III extremely reduced, vestigial or absent	2
— Tibial spurs of leg III moderate	3
2. Male pectines with 23-29 teeth	<i>B. occidentalis</i> Vachon, 1953
— Male pectines with 36-37 teeth	<i>B. mahraouii</i> Lourenço, 2004
3. Tibial spurs of leg IV moderate; chela finger external accessory granules reduced	4
— Tibial spurs of leg IV long; chela finger external accessory granules moderate to strong	5
4. Chela movable finger with 10 rows of granules	<i>B. algerianus</i> Lourenço, 2006
— Chela movable finger with 9 rows of granules	<i>B. maroccanus</i> Lourenço, 2006
5. Male chela manus very inflated and fingers strongly twisted	<i>B. stockmanni</i> Kovařík, Lowe & Štáhlavský, 2016
— Male chela manus slightly inflated and fingers almost straight	6
6. Chela movable finger with 9 rows of granules	<i>B. ziegleri</i> Lourenço, 2000
— Chela movable finger with 10 rows of granules	<i>B. sadinei</i> sp. n.

Morphometric values (mm) (male holotype).

– **Total length** (including telson length): 56.2.

– **Carapace**

length 6.1;
anterior width 2.95;
posterior width 7.05.

– **Mesosoma**: length: 11.05.

– **Metasomal segments**

I, length 5.05; width 3.81;
II, length 6.00; width 3.71;
III, length 6.19; width 3.52;
IV, length 6.76; width 2.95;
V, length 7.62; width 2.86; depth 2.57.

– **Telson**: 7.43.

– **Vesicle**: length 3.33; width 2.10; depth 2.00.

– **Pedipalp**

femur, length 5.43; width 1.62;
patella, length 6.67; width 2.10;
chela, length 9.71; width 2.38; depth 2.67;

– **Movable finger**: 5.71.

Morphometric ratios.

– **Metasomal segment V**

length/width 2.66; length/depth 2.96.

– **Pedipalp chela**

length/width 4.08; length/depth 3.64;
Chela length/movable finger length 1.70.

– **Telson**

length/width 3.54; length/depth 3.72;

– **Vesicle length/Aculeus length** 0.81.

Relationships. – *Buthacus sadinei* sp. n. shows similarities with regard to several morphological characters as well as a similar biotope, with *Buthacus algerianus* described from Western Algeria.

The new species can however be easily distinguished from *B. algerianus* notably by:

- (i) its larger size (43–44 mm in *B. algerianus*);
- (ii) 8 complete carinae on metasomal segment II (10 in *B. algerianus*);
- (iii) chela fingers with 9–10 rows of granules on fixed and movable fingers (10–10 in *B. algerianus*) with external accessory granules moderate to strong (reduced in *B. algerianus*);
- (iv) tibial spurs moderate on leg III, long on IV (moderate on III–IV in *B. algerianus*).

Buthacus sadinei sp. n. can also be easily distinguished from other species associated to the *Buthacus leptochelys* complex occurring in Northern Mauritania, Northern Western Sahara and Morocco, by the different biotope (see relief map in Fig. 10) as well as by the following main features:

– ***B. occidentalis*** from Mauritania:

The new species has:

- (i) a larger size (44–50 mm in *B. occidentalis*);
- (ii) chela fingers with 9–10 rows of granules on fixed and movable fingers (9–9 in *B. occidentalis*);
- (iii) tibial spurs moderate on leg III, long on IV (extremely reduced or absent on III, moderate on IV in *B. occidentalis*).

– ***B. stockmanni*** from Western Sahara and Morocco:

The new species has:

- (i) a carapace uniformly yellowish (orange to brown area on the anterior part of carapace in *B. stockmanni*);
- (ii) much less inflated chela manus, with almost straight fingers (male chela manus very inflated and fingers strongly twisted in *B. stockmanni*);
- (iii) chela fingers with 9–10 rows of granules on fixed and movable fingers (9–9 in *B. stockmanni*).

– ***B. ziegleri*** from Morocco:

The new species has:

- (i) lateromedial carinae of metasomal segment II indicated by several granules on posterior part (such granules are present on both II–III in *B. ziegleri*);
- (ii) 36 setae on metasomal segment V (less than 32 in *B. ziegleri*);
- (iii) chela fingers with 9–10 rows of granules on fixed and movable fingers (11–9 in *B. ziegleri*).

– ***B. mahraouii*** from Morocco:

The new species has:

- (i) a larger size (50 mm in *B. mahraouii*);
- (ii) smaller pectinal tooth count (36–37 in male *B. mahraouii*);
- (iii) 8 complete carinae on metasomal segment II (10 in *B. mahraouii*);
- (iv) chela fingers with 9–10 rows of granules on fixed and movable fingers (9–10 in *B. mahraouii*);
- (v) external accessory granules moderate to strong (reduced in *B. mahraouii*);
- (vi) chela fixed finger with trichobothria **et** situated anteriorly to **dt** (same level in *B. mahraouii*);
- (vii) tibial spurs moderate on leg III, long on IV (vestigial on III, reduced on IV in *B. mahraouii*).

– ***B. maroccanus*** from Morocco:

The new species has:

- (i) a larger size (40 mm in *B. maroccanus*);
- (ii) chela fingers with 9–10 rows of granules on fixed and movable fingers (9–9 in *B. maroccanus*);
- (iii) external accessory granules moderate to strong (reduced in *B. maroccanus*);
- (iv) tibial spurs moderate on leg III, long on IV (moderate on III–IV in *B. maroccanus*).

Ecological characteristics of the region of Tindouf in Western Algeria

Located on a stony plateau (hamada) at an elevation of 400 m above sea level, the region of Tindouf has a subtropical desert climate, typical of the core Saharan region, with extremely hot long summers and very warm short winters. The average annual temperature is 23°C, with summer daytime temperatures commonly approaching 45–50°C (July–August) with blazing sunshine, while winter nighttime temperatures regularly dropping to 5°C or less (December–January). There is very little rain for most of the year (total annual precipitation averages 59 mm), generally concentrated in September–October.

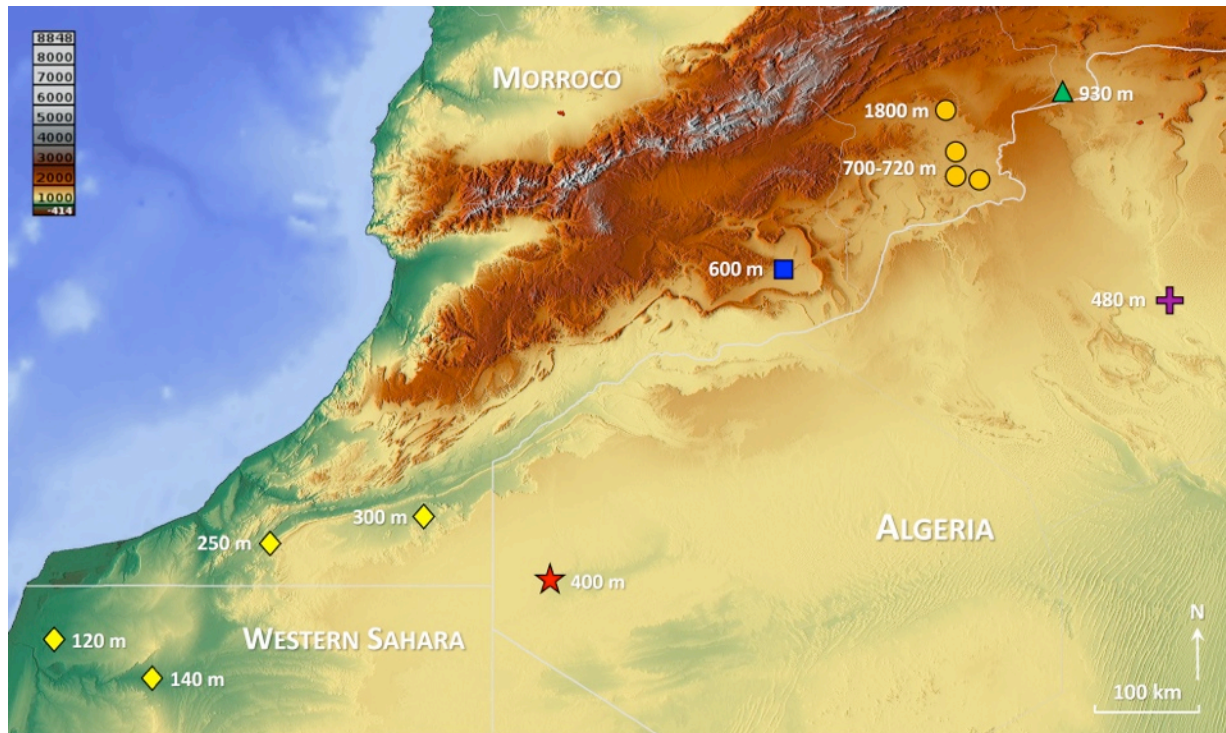


Fig. 10. Relief map of Western Algeria, Southern Morocco and Northern Western Sahara, showing the known distribution of the *Buthacus* species occurring in the region, including elevation of indicated localities.

- | | | |
|------------------------|------------------------|----------------------------|
| ○ <i>B. zieglerei</i> | ▲ <i>B. mahraouii</i> | ✚ <i>B. algerianus</i> |
| ■ <i>B. maroccanus</i> | ◆ <i>B. stockmanni</i> | ★ <i>B. sadinei</i> sp. n. |

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Résumé

Ythier E., 2022. – Une nouvelle espèce de *Buthacus* Birula, 1908 de l'Ouest de l'Algérie (Scorpiones : Buthidae). *Faunitaxys*, 10(28) : 1 – 6.

Une nouvelle espèce appartenant au genre *Buthacus* Birula, 1908 est décrite sur la base d'un mâle adulte collecté à Tindouf, dans l'Ouest de l'Algérie. L'espèce est principalement caractérisée par sa coloration jaunâtre sans aucune tache, des peignes longs atteignant le bord postérieur du sternite V, un aculeus très long et incurvé, les doigts des pinces presque droits avec 9 à 10 rangées de granules sur les doigts fixes et mobiles, respectivement, des granules accessoires modérés à robustes, ainsi que des éperons tibiaux modérés sur la patte III, longs sur la patte IV. Ce nouveau taxon appartient au complexe d'espèces *Buthacus leptochelys* (Ehrenberg 1829) et représente la dixième espèce de *Buthacus* connue pour l'Algérie. La nouvelle espèce est comparée avec les autres espèces du complexe "*leptochelys*" présentes dans l'Ouest de l'Algérie, le Nord de la Mauritanie, le Nord du Sahara Oriental et le Maroc, soit *B. occidentalis* Vachon, 1953, *B. stockmanni* Kovařík, Lowe & Štáhlavský, 2016, *B. zieglerei* Lourenço, 2000, *B. mahraouii* Lourenço, 2004, *B. maroccanus* Lourenço, 2006 et *B. algerianus* Lourenço, 2006, les trois dernières espèces étant de nouveau confirmées en tant qu'espèces valides.

Mots-clés. – Scorpiones, Buthidae, *Buthacus*, taxonomie, nouvelle espèce, description, morphologie, Sahara, Algérie.

Derniers articles publiés

- Lourenço W. R. & Velten J., 2021. – Early Cretaceous Burmite fossils of the genus *Chaerilobuthus* Lourenço & Beigel, 2011 (Scorpiones: Chaerilobuthidae) and description of a particular new species. *Faunitaxys*, 9(30): 1 – 5.
- Ythier E., 2021. – A new species of *Androctonus* Ehrenberg, 1828 from the Sahelian wooded steppes of Burkina Faso (Scorpiones: Buthidae). *Faunitaxys*, 9(31): 1 – 7.
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- Yu K., Zhang S., Zhang F., Li Z. & Yang Z., 2021. – Taxonomic studies on five species of Selenocosmiinae from China (Araneae, Theraphosidae). *Faunitaxys*, 9(33): 1 – 13.
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- Santos-Silva A., 2021. – A new species of *Eudermes* LeConte from Guatemala (Coleoptera, Cerambycidae, Cerambycinae). *Faunitaxys*, 9(36): 1 – 3.
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Illustration de la couverture : telson of *Buthacus sadinei* sp. n.

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