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A NEW SPECIES OF *BUTHACUS* BIRULA, 1908 FROM THE REGION OF GHARDAÏA, ALGERIA (SCORPIONES, BUTHIDAE)

Wilson R. Lourenço[1] & Salah Eddine Sadine[2]

[1] Muséum national d'Histoire naturelle, Département Systématique et Evolution, UMR7205, CP 053, 57 rue Cuvier 75005 Paris, France. — arachne@mnhn.fr
[2] Laboratoire de Recherche sur la Phœniciculture, Faculté des Sciences de la Nature et de la Vie et Sciences de la Terre et de l'Univers. Université KASDI Merbah-Ouargla, [2] Département des Sciences agronomiques, Faculté des Sciences de la Nature et de la Vie et Sciences de la terre, Université de Ghardaïa, BP 455 Ghardaïa 47000, Algeria. — sse.scorpion@yahoo.fr

Abstract: Since the early 2000s, the genus *Buthacus* Birula, 1908 (family Buthidae) has been the subject of an important number of studies. Most of the species considered in these studies come from North Africa, in particular from Morocco, Mauritania and Algeria. One more new species of *Buthacus* is here described from the Algerian Saharan desert, raising the number of confirmed *Buthacus* species in Algeria to six. This new discovery brings further evidence about the complexity of this genus, and also attests to a considerable degree of diversity found in the Algerian Saharan desert.
Key words: Scorpiones, Buthidae, *Buthacus*, new species, Algeria, Ghardaïa region.

Una especie nueva de *Buthacus* Birula, 1908 de la región de Ghardaïa, Argelia (Scorpiones, Buthidae)
Resumen: Desde la década de 2000, el género *Buthacus* Birula, 1908 (familia Buthidae) ha sido objeto de un importante número de estudios. La mayoría de las especies consideradas en estos estudios provienen de África del Norte, en particular de Marruecos, Mauritania y Argelia. Se describe una especie nueva de *Buthacus* del desierto del Sahara argelino, elevando el número de especies de *Buthacus* confirmadas en Argelia a seis. Este descubrimiento aporta nuevas pruebas sobre la complejidad del género, y da fe del grado de diversidad que se encuentra en el desierto del Sahara argelino.
Palabras clave: Scorpiones, Buthidae, *Buthacus*, especie nueva, Argelia, región de Ghardaïa.

Taxonomy / Taxonomía: *Buthacus samiae* **sp. n.**

Introduction

As already outlined in previous publications (Lourenço, 2006, 2013), the genus *Buthacus* was erected by Birula (1908) as a subgenus of *Buthus* Leach, having as its type species *Buthus leptochelys* (Ehrenberg, 1829), described from Sinai (Palestine) as *Androctonus (Leiurus) leptochelys*. Since its creation, *Buthacus* has been considered as a subgenus or as a genus by to different authors. It was finally defined as a valid genus, related to *Buthus*, by Vachon (1949, 1952).

In his important study of the North African scorpions, Vachon (1949, 1952) discussed the wide distribution of the genus *Buthacus*, which was then known from the Atlantic coast of Africa to Palestine. Today the known distribution of this genus is much wider since species are known from Afghanistan and even India (Lourenço, 2004; Zambre & Lourenço, 2010). Vachon (1952) drew the attention to the extreme complexity of this genus and, stated that no one could be certain about its precise composition. He also drew attention to the fact that *Buthacus leptochelys* (Ehrenberg) and *Buthacus arenicola* Simon could represent two complexes of forms or species.

In their '*Fauna Palaestina'* Levy and Amitai (1980) equally attempted to divide the genus *Buthacus* in two groups mainly on basis of the structure of the dentition of the movable finger. They also discussed the difficulties of making a precise definition of several forms, and stated as follows: *'These groups could be further divided according to other characters however, the definite position of several forms from North Africa is still uncertain'*. This opinion follows that of Vachon (1952) in the sense that *Buthacus leptochelys* and *Buthacus arenicola* undoubtedly represent not individual species but rather complexes of species.

The efforts enterprise by Lourenço (2006) to clarify the status of some *Buthacus* populations in North Africa, conducted to the description of some new species, including from Algeria (Lourenço, 2006, 2013). Recent field work performed by the junior author in the Region of Ghardaïa, North of the Central Algerian Saharan region lead to the collection of several *Buthacus* specimens. Precise analysis of these specimens showed that they were different from *Buthacus birulai* Lourenço, 2006, species also distributed in the North of Algeria. Consequently, a new species of *Buthacus* is described here. This new description attests to a considerable degree of diversity found in the Algerian Saharan Desert (Lourenço & Sadine, 2014).

Ecological comments on the Region of Ghardaïa

The Region of Ghardaïa, is located in the North of the Central Algerian Saharan region (Fig. 1 map) and covers a total area of ca. 86,560 km^2. The average altitude of the main reliefs is of 520 meters. Geomorphological features are constituted by the Regs and Ergs (Benkenzou *et al*., 2007). The region is characterized by a dry Saharan climate with extreme thermal amplitudes between the day and the night, reaching 15-16 degrees (Sam, 2012). The coldest month is January with a minimal temperature of 6.2°C, whereas the hottest month is July with a maximum temperature of 41.8°C.

Rain fall is extremely low in the region of Ghardaïa with an average value of 80.2 mm per year. Air humidity is rather weak with a maximum value of 55.5% in December and a minimum of 21.6% in July (Chehma, 2011). Analysis of dry periods over several years attest that 11 months are dry

ranging from February to December; only a short and slightly more humid period can be experienced in January.

The new species described here was collected in zones of desert rocks with sand beds but also in sand dunes with scarce grasses vegetation - Regs and Ergs (Fig. 2-3). The new species, *Buthacus samiae* sp. n. shows all the characteristics of a typical psammophilic element (Fig. 4).

Methods

Illustrations and measurements were made with the aid of a Wild M5 stereo-microscope with a drawing tube (camera lucida) and an ocular micrometer. Measurements follow Stahnke (1970) and are given in mm. Trichobothrial notations are those of Vachon (1974) and morphological terminology mostly follows Vachon (1952) and Hjelle (1990).

Taxonomic account

BUTHIDAE C. L. Koch, 1837

Buthacus Birula, 1908

Buthacus samiae sp. n. (Fig. 5-18; Table I)

TYPE MATERIAL. Algeria, Region of Ghardaïa, Hassi L'Fhel (31° 43' N, 003° 44' E), in Reg with sand bed, 466 m, 17/I/2014 (S. E. Sadine); male holotype, 1 male, 2 female paratypes. Sebseb (32° 08' N, 03° 39' E), in Erg formation, 455 m, 7/III/2015 (S. E. Sadine); 1 male, 3 female paratypes. Holotype and five paratypes deposited in the Muséum national d'Histoire naturelle, Paris; two paratypes deposited in the University of Ghardaïa, Algeria.

ETYMOLOGY: Honors Professor Samia Bissati, Université KASDI Merbah-Ouargla for her constant support to the junior author's work.

DIAGNOSIS: Scorpions of moderate to small size with a total length of 54.9 and 56.7 mm for largest male and female respectively. General coloration yellow to pale yellow without spots in adults. Pedipalps with 8-9 rows of granules on the fixed and movable fingers; external accessory granules absent; internal accessory granules moderately marked. Larges granules dividing rows are conspicuous. Trichobothriotaxy A-β (beta) orthobothriotaxic; fixed fingers with trichobothria **et** and **dt** situated at the same level and, trichobothria **esb** and **eb** closed to each other. Dorsal and latero-dorsal carinae on metasomal segments I to IV without any well marked spiniform granules; latero-ventral carinae on segment V with spinoid granules and some inconspicuous lobes. Tibial spurs moderate to weak on legs III and IV. Pectinal tooth count 28 to 32 in males and 24 to 26 in females.

DESCRIPTION based on holotype and paratypes (measurements in Table I). **Coloration**: Generally yellow to pale yellow without any spots or pigmented zones on the body and appendages. Prosoma: carapace yellow to slightly reddish-yellow; only the eyes surrounded by black pigment. Mesosoma: yellow, slightly darker in the median zone. Metasomal segments yellow. Vesicle yellow; aculeus yellow at the base and reddish at its extremity. Venter yellow; pectines pale yellow. Chelicerae yellow; denticles dark red. Pedipalps: yellow overall; rows of granules on the dentate margins of the fingers reddish. Legs yellow, paler than body.

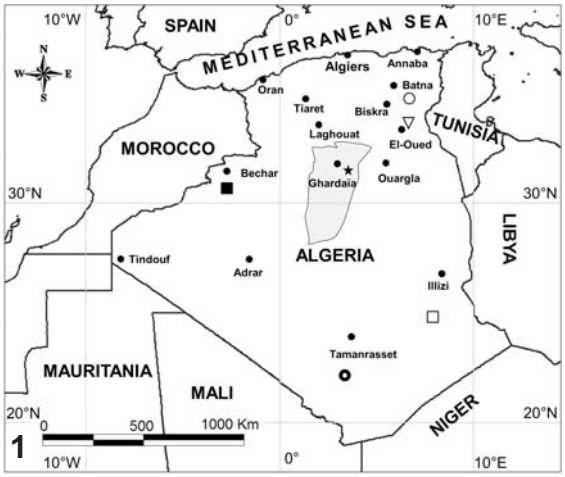
Table I. Morphometric values (in mm) of male (holotype) and female paratype of *Buthacus samiae* sp. n.

	♂	♀
Total length (telson included)	54.9	56.7
Carapace:		
-length	5.5	6.2
-anterior width	3.4	3.8
-posterior width	6.2	6.7
Mesosoma length:	14.2	15.7
Metasomal segment I:		
-length	4.7	4.6
-width	3.6	3.8
Metasomal segment II:		
-length	5.4	5.3
-width	3.3	3.6
Metasomal segment III:		
-length	5.6	5.5
-width	3.2	3.4
Metasomal segment IV:		
-length	6.0	5.8
-width	2.7	2.8
Metasomal segment V:		
-length	7.2	6.9
-width	2.7	2.8
-depth	2.4	2.5
Telson:		
- length	6.3	6.7
- width	2.0	2.1
- depth	1.9	2.2
Pedipalp:		
- Femur length	4.9	4.6
- Femur width	1.4	1.6
- Patella length	6.2	6.0
- Patella width	1.9	2.1
- Chela length	8.5	8.4
- Chela width	1.8	1.4
- Chela depth	2.0	1.7
Movable finger:		
- length	5.3	5.8

Prosoma: Anterior margin of carapace not emarginate, straight to slightly convex. Carapace carinae weakly developed; anterior median carinae weak to obsolete; central median, posterior median and central lateral carinae weak to obsolete; carinae better marked on females. All furrows weak to obsolete. Intercarinal spaces weakly granular to smooth. Median ocular tubercle slightly anterior to the centre of the carapace; median eyes separated by one and a half ocular diameters. Four pairs of lateral eyes; the first three disposed in one line, the fourth situated behind eye three. **Mesosoma**: Tergites I-VI tricarinate; all carinae very weak; lateral carinae vestigial on segment I; tergite VII pentacarinate, with lateral pairs of carinae moderate; median carinae present on proximal one-half, moderately marked. Intercarinal spaces weakly granular to smooth. Sternites: carinae absent from sternites III-VI;

►

Fig. 1. Map Algeria showing the confirmed records of *Buthacus* species: *B. armasi* (white square). *B. arenicola arenicola* (white circle). *B. birulai* (inverted white triangle). *B. foleyi* (black circle with white dot). *B. leptochelys algerianus* (black square). *B. samiae* sp. n (black star). **Fig. 2.** Habitat type Reg formation with sand bed, found in Hassi L'Fhel, Ghardaïa. **Fig. 3.** Habitat type Erg formation with grasses, found in Sebseb, Ghardaïa. **Fig. 4.** *Buthacus samiae* sp. n., male juvenile alive, in natural habitat. **Fig. 5-8.** *Buthacus samiae* sp. n. Male holotype (5, 6) and female paratype (7, 8); habitus, dorsal and ventral aspects.


10°W
SPAIN
0°
MEDITERRANEAN SEA
10°E
N
W
E
S
Algiers
Annaba
Batna
Oran
Tiaret
Biskra
TUNISIA
Laghouat
El-Oued
MOROCCO
Bechar
Ghardaia
Ouargla
30°N
30°N
LIBYA
Tindouf
Adrar
ALGERIA
Illizi
Tamanrasset
MAURITANIA
MALI
NIGER
20°N
20°N
0
500
1000 Km
1
10°W
0°
10°E


2


3


4


5
6
7
8

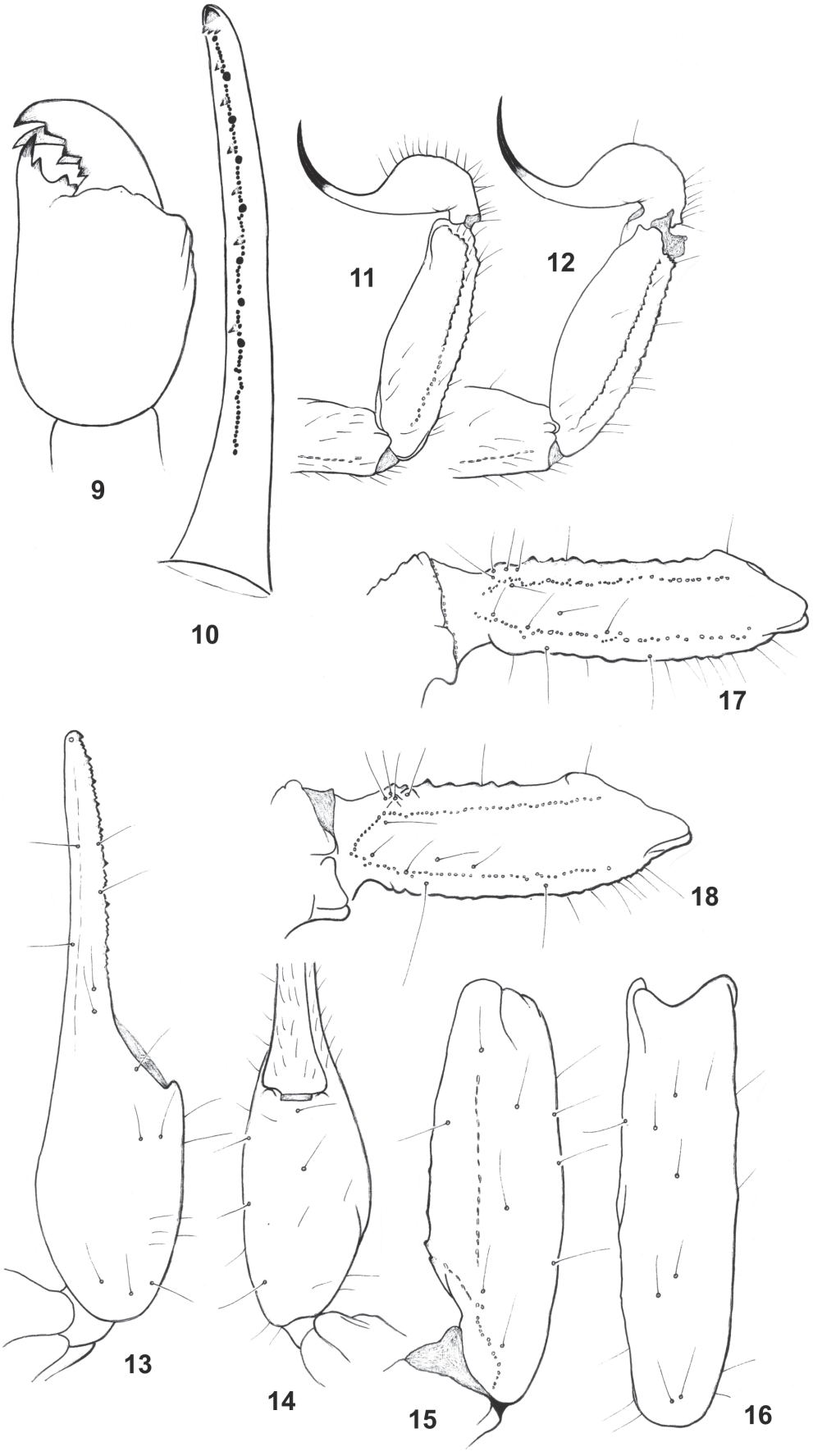


Fig. 9-18. *Buthacus samiae* sp. n. **9-11**, **13-17.** (male holotype). **12**, **18**. (female paratype). **9**. Chelicerae, dorsal aspect. **10**. Cutting edge of movable finger. **11-12**. Metasomal segment V and telson, lateral aspect. **13-18**. Trichobothrial pattern: **13-14**. Chela, dorso-external and ventral aspects. **15-16**. Patella, dorsal and external aspects. **17-18**. Femur, dorsal aspect.

moderate to weak on VII. Pectines long; pectinal tooth count 29-30 in male holotype and 25-26 in female paratype (see diagnosis for variation in paratypes). **Metasoma**: segments I and II with 10 carinae; III and IV with 8 carinae; intermediate carina incomplete on II. Ventral carinae vestigial on segments I, weak on II, moderate on III and IV; dorsal carinae without any well marked spinoid granules on segments I and II. Segment V with five carinae; ventrolateral armed with small spinoid granules and some inconspicuous lobes. Dorsal furrows in all segments weakly developed, smooth; intercarinal spaces not granular, smooth. Metasomal setation moderately to strongly marked. **Telson** smooth. Aculeus longer than vesicle; subaculear tubercle absent; setation strongly marked. Chelicerae movable finger with external distal denticle shorter than internal distal; two reduced but not fused denticles at the base of the movable finger (Vachon, 1963). **Pedipalps**: trichobothrial pattern orthobothriotaxic, type A as defined by Vachon (1974); trichobothria **et** and **dt** of fixed finger situated at the same level; dorsal trichobothria of femur in β (beta) configuration (Vachon, 1975). Femur pentacarinate; all carinae moderately crenulate. Patella with vestigial internal carinae, almost smooth; chela without carinae, smooth. Dentate margins on fixed and movable fingers composed of 8-9 almost linear rows of granules; internal accessory granules represented by moderate to small basal granules; external absent; the granulation is not masked by setation. **Legs**: ventral aspect of tarsi with numerous long thin setae; general setation typical of a psammophilous species. Tibial spurs moderate to weak on legs III-IV. Pedal spurs moderate on all legs.

RELATIONSHIPS. By the absence of external accessory granules and its zone of distribution, the new species seems to be more closely related to *Buthacus birulai* Lourenço, 2006, a species known from the northeast of Algeria. Both species can be distinguished, however, by a number of features: (i) smaller global size in the new species, with distinct morphometric values (ii) pectinal tooth count shows lower numbers in the new species; 24 to 32 vs 29 to 35 in *B. birulai*, (iii) fixed and movable fingers of pedipalps with 8-9 rows of granules vs 9-10 in *B. birulai*.

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