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### The *Buthacus* Birula, 1908 populations from Tassili n'Ajjer, Algeria (Scorpiones, Buthidae) and description of a new species

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(with 14 figures)

#### Abstract

Three *Buthacus* species were previously recorded from the mountains of Tassili n'Ajjer in the South of Algeria by Vachon: *Buthacus foleyi* Vachon, 1948, *B. arenicola* (Simon, 1885) and *B. leptochelys* (Ehrenberg, 1829). This last one is now confirmed as a new species. The description is based on one adult male and two female specimens recently collected in Tassili n'Ajjer, and on one of the specimens previously cited from this region by Vachon as *B. leptochelys*. The new species is presumably endemic to Tassili n'Ajjer.

**K e y w o r d s:** Scorpion, Buthidae, *Buthacus*, new species, Tassili n'Ajjer, Algeria.

#### Introduction

Scorpion diversity is particularly high in the arid regions including deserts (Polis 1990, Lourenço *et al.* 2012). The scorpion fauna of North Africa, and in particular the one specifically adapted to the Sahara desert has been the subject of several studies, as synthesised in the monographic work of Vachon (1952). Nevertheless, more detailed inventory work, and the revision of classical groups has led to an increasing number of new species and even new genera (e.g. Lourenço 2001, Lourenço *et al.* 2012).



**Fig. 1.** *Buthacus armasi* sp. n., female paratype (alive) in laboratory.

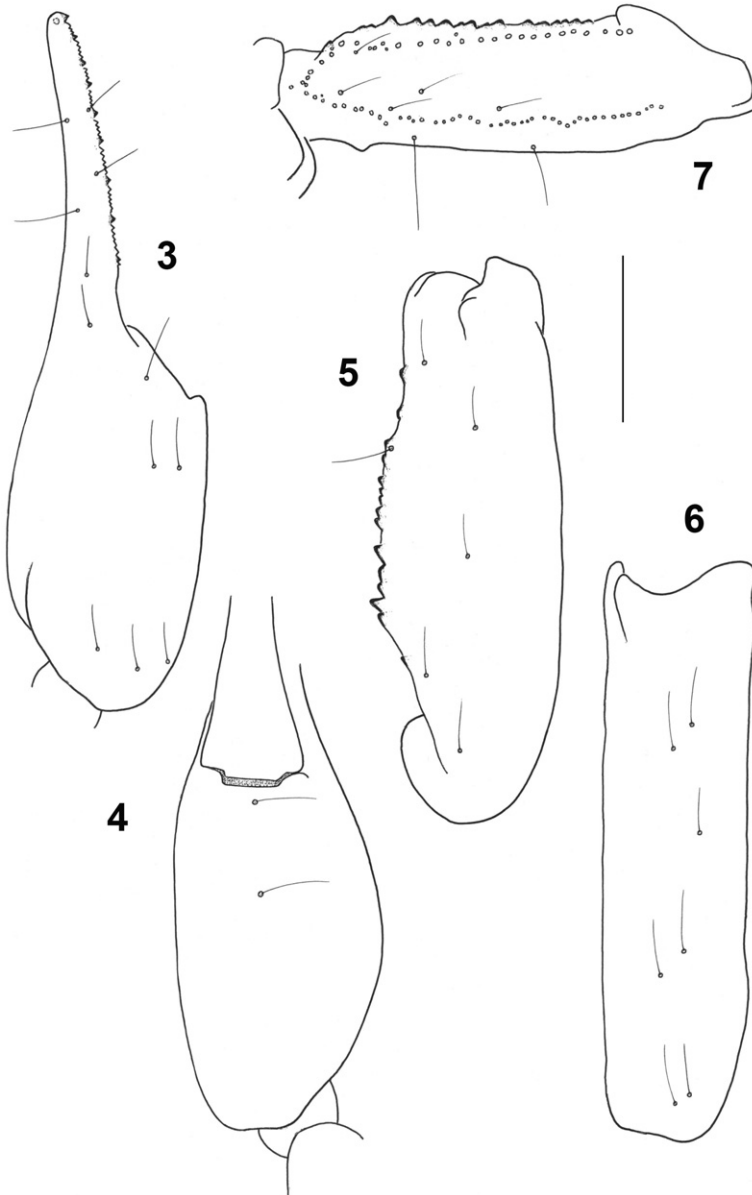
Although the core Saharian region, defined by Vachon (1952) as the 'central compartment' has been the subject of most scorpion studies, other regions also call the attention of scorpion experts. Many of these additional species are present only in refuge zones. These may be represented by oases, but in most cases correspond with the Saharan mountain massifs, such as Hoggar, Tassili n'Ajjer, Aïr, Adrar, Tibesti, Ennedi and Kapka (Lourenço *et al.* 2012). These areas have attracted the attention of naturalists since the middle of the 20<sup>th</sup> century, and a number of works on scorpions have been published (Vachon 1940, 1950, 1958). These preliminary results, however, proved unsatisfactory since most local faunal elements in these massifs were simply identified as species known from other areas. More recent studies demonstrate that many of these local populations are, in fact, endemic species (Lourenço *et al.* 2012).

In a recent note on the African populations of *Buthacus* (Lourenço 2006), a clarification of the status of several species of this complex genus of scorpions was attempted. However, the identity of *Buthacus* from the Tassili n'Ajjer mountain range has been postponed.

In his study about the scorpions from Tassili n'Ajjer in the South of Algeria, Vachon (1958) listed three *Buthacus* species: *Buthacus foleyi* Vachon, 1948, *Buthacus arenicola* (Simon, 1885) and *Buthacus leptochelys* (Ehrenberg, 1829). *B. foleyi* is indeed an endemic species from the mountain ranges of the South of Algeria. *B. arenicola* record was not confirmed for this region (Lourenço 2006), and possibly is a misidentification by Vachon (1958). At the



**Fig. 2.** Habitat of *Buthacus armasi* sp. n. Dry formation in the region of Tassili n'Ajjer in South of Algeria (photo by P. Geniez).



**Figs 3-7.** *Buthacus armasi* sp. n., male holotype. Trichobothrial pattern. **3-4.** chela, dorso-external and ventral aspects; **5-6.** patella, dorsal and external aspects; **7.** femur, dorsal aspect. Scale bar = 2 mm.

same time, *B. leptochelys* records are now confirmed as a new species. At least one of the specimens studied by Vachon (1958), and collected by F. Bernard, was located in the collections of the Muséum in Paris. The specimen is faded in ethanol and details of the coloration are no longer observable. However, the recent collections of one adult male and two female specimens in the region of the Tassili n'Ajjer suggest that the new species is close to *Buthacus occidentalis* Vachon, 1953, described from mountain ranges in Mauritania. The new species is presumably endemic to Tassili n'Ajjer. For more details about the composition of the scorpion fauna of Tassili n'Ajjer and other Sahara mountain ranges, see Lourenço *et al.* (2012).

## 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

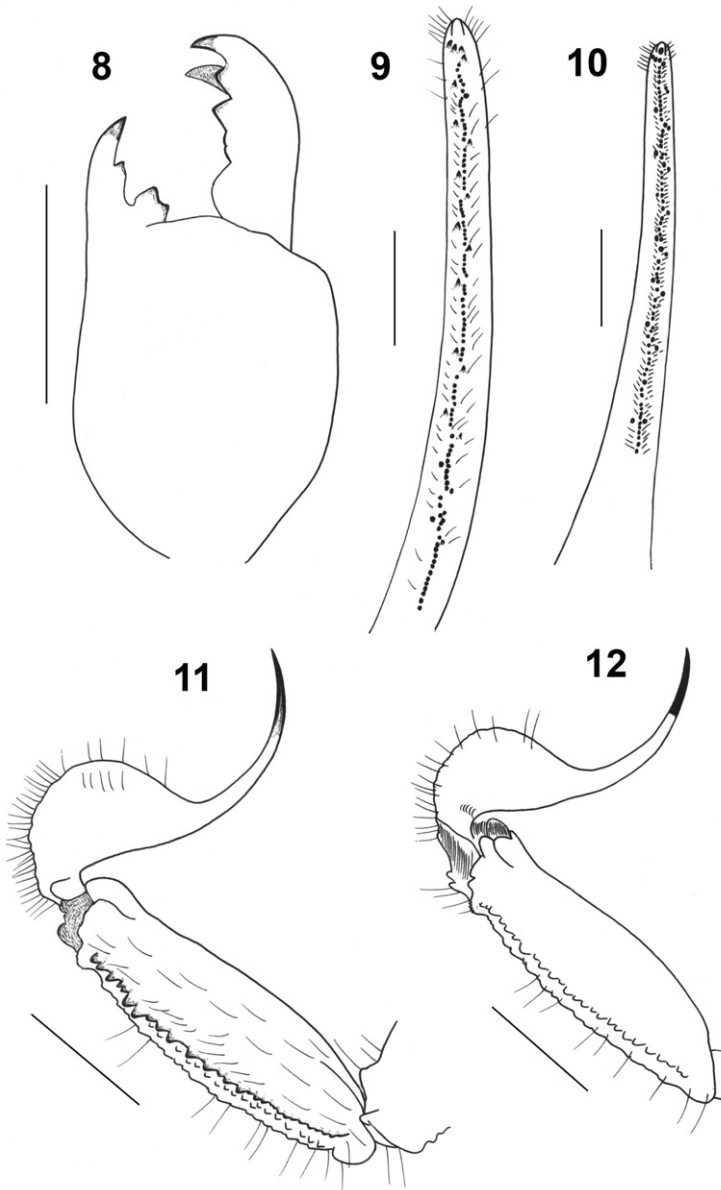
*Buthacus armasi* sp. n.

(Figs 1, 3-12)

TYPE MATERIAL. Holotype, male (ZMH Acc. No. A19/13). Algeria, Tassili n'Ajjer, Issendelene, NW Djanet, October 1978 (P.M. Brignoli leg.), Idem, Issendelene (station 37), 16 April 1949 (F. Bernard leg.) (MNHN-RS-3057), female paratype. Idem, Issendelene, 65 km NW Djanet, 1160 m, 19 April 2009 (Ph. Geniez leg.), female paratype. Ibidem, Guelta de TinAr, near Torset, 113 km W Djanet, 22 April 2009 (P.A. Crochet & Ph. Geniez leg.), female paratype. Holotype and two paratypes (ZMH Acc. No. A20/13) deposited in the Zoologisches Museum, Hamburg. One paratype deposited in the Muséum national d'Histoire naturelle, Paris.

PATRONYM: Honours Dr. Luis F. de Armas, La Habana, Cuba, for his contribution to the taxonomy of scorpions.

DIAGNOSIS: Scorpions of moderate size with a total length of 58.9 mm for male and 45.5 mm for the largest female. General coloration yellowish to pale yellow without spots; female carapace with a single proximal inverted orange to reddish triangle (see Fig. 1). Pedipalps with 8-9 rows of granules on the fixed and movable fingers; external accessory slightly smaller than internal accessory granules. Trichobothriotaxy  $A-\beta$  (*beta*) orthobothriotaxic; trichobothria *et* and *dt* of fixed finger situated at the same level. 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 lobes. Tibial spurs moderate to weak on legs III and IV. Pectinal tooth count 27-28 for male holotype and 21 to 23 in female paratypes.



**Figs 8-9, 11.** *Buthacus armasi* sp. n., male holotype. 10-12 *Buthacus occidentalis* Vachon, male lectotype. **8.** chelicera, dorsal aspect; **9-10.** disposition of the granulation over the dentate margin of the movable finger; **11-12.** metasomal segment V and telson, lateral aspect. Scale bars: 8-10 = 1 mm; 11-12 = 3 mm.

**DESCRIPTION** (measurements in Table 1).

**C o l o r a t i o n:** Generally yellowish to pale yellow without any spots or pigmented zones on the body and appendages. **P r o s o m a:** carapace yellowish; female carapace with a single proximal inverted orange to reddish triangle; only the eyes surrounded by black pigment. **M e s o s o m a:** yellowish, paler in the median zone. **M e t a s o m a l** segments yellowish. Vesicle yellowish; aculeus yellowish at the base and reddish at its extremity. Venter yellowish; pectines pale yellow. **C h e l i c e r a e** yellowish; denticles reddish. **P e d i p a l p s:** yellowish overall; rows of granules on the dentate margins of the fingers reddish. **L e g s** yellowish, paler than body.

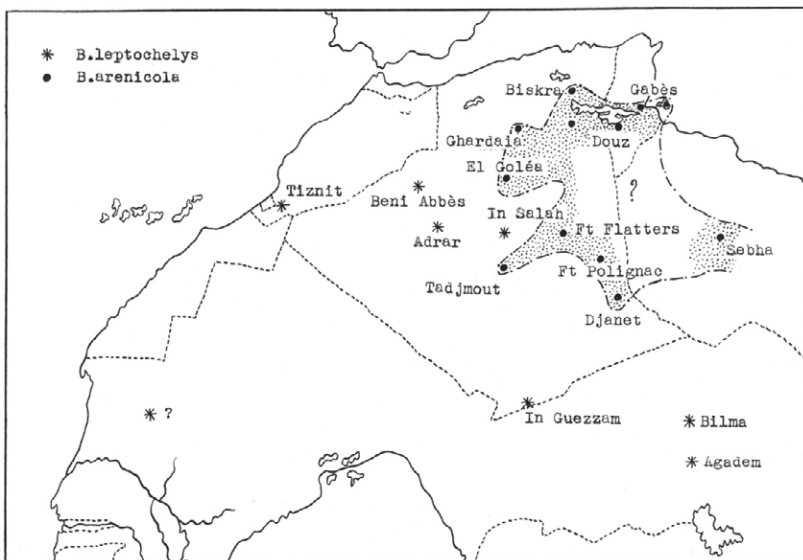
**Table 1.** Morphometric values (in mm) of male (holotype) and female paratype of *Buthacus armasi* sp. n.

	♂	♀
Total length*	58.9	45.5
Carapace:		
- length	6.1	4.6
- anterior width	3.9	3.2
- posterior width	6.8	5.5
Mesosoma length:	13.8	12.0
Metasomal segment I:		
- length	5.2	3.6
- width	3.8	2.8
Metasomal segment V:		
- length	8.2	5.9
- width	2.8	2.1
- depth	2.6	1.9
Telson length:	6.7	5.5
- width	2.1	1.6
- depth	2.0	1.4
Pedipalp:		
- femur length	5.7	4.2
- femur width	1.6	1.2
- patella length	6.8	5.2
- patella width	2.3	1.7
- chela length	9.8	6.8
- chela width	2.5	1.2
- chela depth	2.6	1.4
Movable finger:		
- length	5.8	4.8

\*Including telson length.

**MORPHOLOGY.** **P r o s o m a:** Anterior margin of carapace not emarginate, straight to slightly convex. Carapace carinae weakly developed; anterior median carinae weak; central median, posterior median and central lateral carinae weak to obsolete. 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 or five pairs of lateral eyes; the first three disposed in one

line, the fourth and fifth situated behind eye three. *M e s o s o m a*: 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; moderate to weak on VII. Pectines long; pectinal tooth count 27-28 in male holotype and 21-22, 23-23 in paratypes. *M e t a s o m a*: segments I and II with 10 carinae; III and IV with 8 carinae. Ventral carinae vestigial on segments I, weak on II, moderate on III-IV; dorsal carinae without any well marked spinoid granules on segments I and II. Segment V with five carinae; ventrolateral armed with spinoid granules and some 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. *C h e l i - c e r a e* movable finger with external distal denticle shorter than internal distal; two very 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  $\beta$  (*beta*) configuration (Vachon 1975). Femur pentacarinate; all carinae moderately crenulate. Patella with 7-8 vestigial carinae; chela without carinae, smooth. Dentate margins on fixed and movable fingers composed of 8-9 almost linear rows of granules; internal and external accessory granules represented by moderate to small basal granules; the granulation is moderately masked by setation.



**Fig. 13.** Western North Africa with the distribution of *Buthacus* species as presented by Vachon (1952). Some localities are indicated with a question mark.



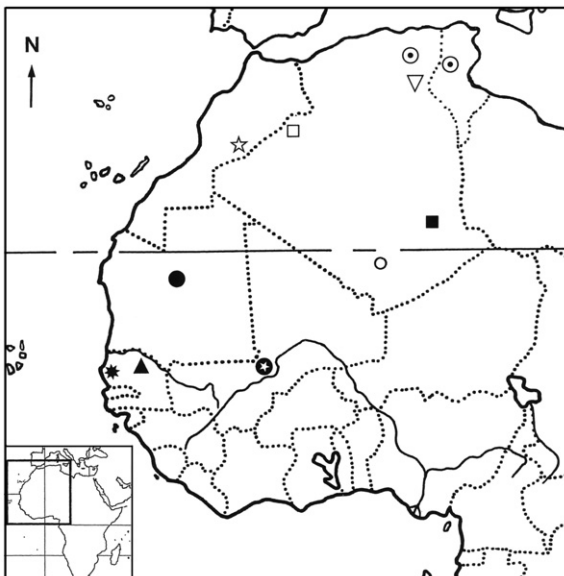


Fig. 14. Western North Africa with the confirmed records of *Buthacus* species. *B. armasi* sp. n. (black square). *B. arenicola arenicola* Simon (open circle with black dot). *B. arenicola maroccanus* Lourenço (white star). *B. birulai* Lourenço (white inverted triangle). *B. clevai* Lourenço (black triangle). *B. foleyi* Vachon (open circle). *B. leptochelys algerianus* Lourenço (white square). *B. maliensis* Lourenço & Qi (black circle with white star). *B. occidentalis* Vachon (black circle). *B. villiersi* Vachon (black star).

**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.

**REMARKS.** The new species seems to be close to *Buthacus occidentalis*, a species endemic to Mauritania. It can be distinguished, however, from the latter species by a number of features: (i) a slightly larger global size, (ii) pectinal tooth count shows a slightly higher number in females, 21-23 vs 19-20, (iii) presence of lobes on latero-ventral carinae of metasomal segment V, (iv) cheliceral movable fingers with very reduced basal denticles, (v) a quite distinct geographical area of distribution.

### **Other specimens collected in the Tassili n'Ajjer, also deposited in the Zoologisches Museum Hamburg**

*Androctonus* Ehrenberg, 1828

*Androctonus hoggarensis* (Pallary, 1929)

**MATERIAL:** Algeria, Tassili n'Ajjer, Guelta de TinAr, near Torset, 113 km NW Djanet, 22 April 2009 (P.-A. Crochet & Ph. Geniez leg.). Female juv. (ZMH Acc. No. A21/13).

*Androctonus amoreuxi* (Audouin, 1826)  
(and *Androctonus eburneus* (Pallary, 1928))

Vachon (1958) listed *Androctonus amoreuxi* among the species present in the Tassili n'Ajjer, but disregarded *Androctonus eburneus*, described by Pallary since previously (Vachon, 1955) he placed both species in synonymy.

In a recent publication (Lourenço 2008), the type material of *A. eburneus*, composed of one male and one female specimen, was revised. Although the type material was poorly preserved, most useful characters could be observed. The total size of both male and female is 47 mm, what makes this species to be much smaller than *A. amoreuxi*. Pectinal tooth count shows 38-37 teeth for the male and 24-22 for the female. These values are higher than those observed for *A. amoreuxi* (Lourenço, 2005). Vachon (1955) indicated a variation of 28 to 33 teeth in the pectines of *A. amoreuxi*, but 32 to 37 teeth for the population found in the Hoggar Massif. Consequently, he suggested that the Hoggar population could represent a 'particular form'. No doubt that the population present in the Hoggar Massif was probably isolated in a sort of refugium since Tertiary times. Consequently, *A. eburneus* was revalidated as a species distinct from *A. amoreuxi*. As suggested by Lourenço (2008), this last species has a distribution range more limited to the Central region of Sahara.

One female specimen, collected more to the north of the Tassili n'Ajjer, is included in the present study. Material: Algeria, S of Assekaifaf, September 1978 (P.-M. Brignoli leg.). Female. (ZMH Acc. No. A21/13).

*Compsobuthus* Vachon, 1949  
*Compsobuthus tassili* Lourenço, 2010

MATERIAL: Algeria, Tassili n'Ajjer, Issendelene, NW Djanet, October 1978 (P.-M. Brignoli leg.). Female. (ZMH Acc. No. A21/13).

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