



## On the presence of the genus *Buthus* Leach, 1815 in Sudan with the description of a new species from the enclave of Karora (Scorpiones: Buthidae)

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**Abstract.** The presence of the genus *Buthus* Leach, 1815 in Sudan is discussed and a new species, *Buthus karoraensis* sp. n., is described on the base of eight specimens from Karora, an Eritrean enclave within Sudan. Although the new species is almost surely present also in Sudan, actually the only known species remains *Buthus brignolii* Lourenço, 2003.

**Riassunto.** Sulla presenza del genere *Buthus* Leach, 1815 in Sudan con la descrizione di una nuova specie dall'enclave di Karora (Scorpiones: Buthidae). La presenza del genere *Buthus* Leach, 1815 in Sudan viene discussa ed una nuova specie, *Buthus karoraensis* sp. n., viene descritta sulla base di otto esemplari provenienti da Karora, un'enclave eritrea all'interno del Sudan. Sebbene la nuova specie sia quasi sicuramente presente anche in Sudan, in realtà la sola specie conosciuta rimane *Buthus brignolii* Lourenço, 2003.

**ملخص.** عن وجود جنس *Buthus* Leach, 1815 في السودان ، مع وصف نوع جديد من منطقة كارورا (Scorpiones: Buthidae). تم مناقشة وجود جنس *Buthus* Leach, 1815 في السودان ، وتم وصف نوع جديد - *Buthus karoraensis* sp. n. - استناداً إلى ثمانى عينات من كارورا ، المنطقة الإريترية داخل السودان. وبالرغم من أن النوع الجديد موجود أيضاً بشكل مؤكد تقريباً في السودان ، يظل النوع الوحيد المعروف بشكل رسمي فعلياً هو *Buthus brignolii* Lourenço, 2003.

**Key words.** Scorpion, *Buthus*, new species, Karora, Sudan.

### Introduction

As explained in several recent papers, the historical species *Buthus occitanus* (Amoreux, 1789), considered for over two centuries as a polymorphic species widespread in Europe, Africa and Middle East is now reported only from western Europe (LOURENÇO & VACHON, 2004; SOUSA *et al.*, 2010; ROSSI, 2012). Consequently all previous records of *Buthus occitanus* from other countries and continents are considered incorrect. According with this taxonomic decision which overtakes the unsatisfactory revision of VACHON (1952), the known subspecies of *Buthus occitanus* from Africa and Middle East were raised to species status (LOURENÇO, 2003, 2008; KOVAŘÍK, 2006; LOURENÇO *et al.*, 2010) and many new species were described from Europe (LOURENÇO & VACHON, 2004; ROSSI, 2012; LOURENÇO & ROSSI, 2013), Middle East (LOURENÇO, 2008; LOURENÇO *et al.*, 2010; YAĞMUR, *et al.*, 2011) and especially from Africa (LOURENÇO, 2002, 2003, 2005a, 2005b, 2005c, 2013, 2015; LOURENÇO & SLIMANI, 2004; LOURENÇO & GENIEZ, 2005; LOURENÇO & QI, 2006; LOURENÇO *et al.*, 2009; LOURENÇO & CLOUDSEY-THOMPSON, 2012; LOURENÇO & SIMON, 2012; LOURENÇO & LEGUIN, 2012; LOURENÇO *et al.*, 2012a; LOURENÇO *et al.*, 2012b; KOVAŘÍK, 2006, 2011; TOULOUN & BOUMZEZOUH, 2011; ROSSI, 2013; ROSSI *et al.*, 2013; SADINE *et al.*, 2016).

Concerning African *Buthus* Leach, 1815, the majority of the works are focused on northern Africa and the Saharan regions while only few articles are dedicated to the *Buthus* from East-Africa.

In the present work, we discuss about the presence of the genus *Buthus* in Sudan, especially due to changes in political geography. The first record of the genus *Buthus* from Sudan was that of VACHON (1955). However it could be considered, at least, doubtful (LOURENÇO, 2005a).

*Buthus jianxinae* Lourenço, 2005 originally described from the region of South Sudan, within Sudan (LOURENÇO, 2005a), is now considered among the fauna of South Sudan, which is an independent country since July 2011.

Thus the only *Buthus* species in Sudan remains *Buthus brignolii* Lourenço, 2003, described from Darfur (LOURENÇO, 2003), which is now compared with several specimens of the genus *Buthus* from Karora, an Eritrean enclave within Sudan. Our analysis shows that this population represents a new species, hereby described.

### Material and methods

Measurements, given in mm, follow HJELLE (1990), and terminology follows SISSOM *et al.* (1990).

### Abbreviations

L = length; W = width; H = height; MHNG = Muséum d'Histoire Naturelle de Genève, Geneva, Switzerland; MSNB = Museo Civico di Scienze Naturali di Bergamo "E. Caffi", Bergamo, Italy; MZUF = Museo di Storia Naturale dell'Università degli Studi di Firenze, sezione di Zoologia "La Specola", Florence, Italy.

### Taxonomy

Buthidae Koch, 1837

*Buthus* Leach, 1815

***Buthus brignolii*** Lourenço, 2003

*Buthus* sp. VACHON, 1955;

*Buthus brignolii* LOURENÇO, 2003

Type locality and type repository: Sudan, Darfur, Djebel Meidob, MHNG.

Material examined: Sudan, Darfur, Djebel Meidob, MHNG, ♀ holotype.

Revised diagnosis:

Total length 39 mm. Pectinal teeth number 28-29 in female. Movable fingers of pedipalps with 10 rows of granules with one internal and one external granule and three distal granules. Telson bulbous, with aculeus shorter than vesicle. Basic colour is yellow with dark reticulations only on pedipalps (chela, patella and femur). Chela length to width ratio very high (5) in female. Male unknown.

Comments:

*B. brignolii* is a very small species. Males are unknown but, since the females of *Buthus* in East-Africa are generally bigger in size than males, the males of *B. brignolii* could really be the smallest African *Buthus*.

***Buthus karoraensis* sp. n.** (Figs 1-13)

*B. occitanus berberensis* KOVAŘÍK, 2003 (misidentified) in part;

*B. occitanus* KOVAŘÍK & WHITMAN, 2005 (misidentified) in part;

Type material: Eritrea: Karora [enclave within Sudan], ♂ holotype, 1 ♂ paratype, ♀ allotype [currently paratype] and 3 ♀♀ paratypes, leg. L. Cipriani, MZUF 610; same data as holotype, 1 ♂ and 1 ♀ paratypes, MSNB 12749, 12748.

Etymology: The name refers to the locality of origin of the new species (Fig. 14).



Figs 1-2. Male paratype (MSNB) of *Buthus karoraensis* sp. n., dorsal (1) and ventral (2) view.

**Diagnosis:** scorpion of small size for the genus, reaching 51 mm in males and 60 in females. General coloration uniformly yellow without dark stripes or pigmentation on pedipalp carinae. Carinae of carapace and tergites less marked. Carinae of metasomal segments moderately marked except for ventral carinae of II and III metasomal segments which are lobate, especially in females. Movable fingers with 11 rows of granules. Pectines with 31-34 teeth in males and 23-27 in females.

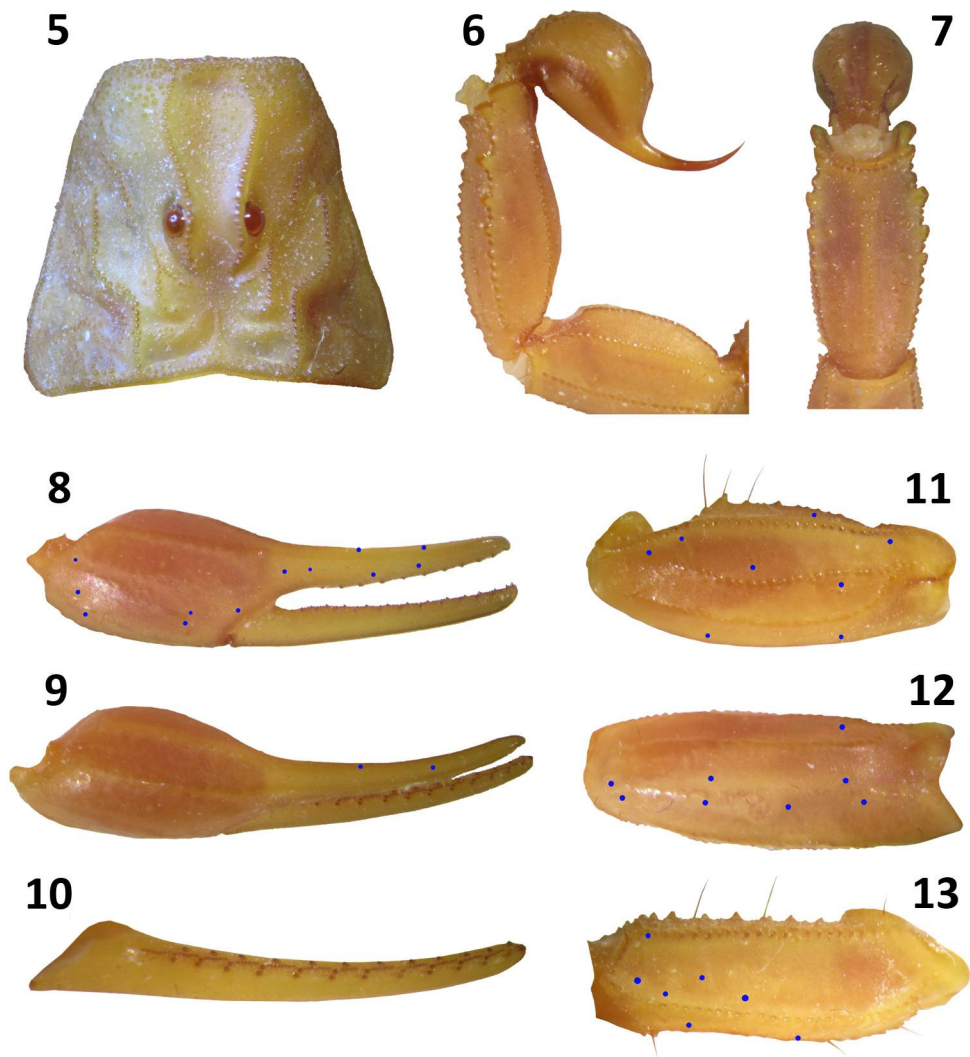
**Description:** based on male holotype. Measurements are given in Table 1. Coloration basically yellowish. Prosoma: moderately marked anterior median carinae; central lateral and posterior median carinae are less marked; posterior lateral carina with the typical lyre carinae configuration of the genus *Buthus* which is however scarcely evident. Median eyes and three pairs of lateral eyes black. Chelicerae: yellow, not reticulated; typical dentition of family Buthidae. Legs: yellow; coxa, femur



Figs 3-4. Female paratype (MSNB) of *Buthus karoraensis* sp. n., dorsal (3) and ventral (4) view.

and patella with moderate carinae and sparsely hirsute; tarsus with two ventrally longitudinal rows of setae. Robust tibial spurs present on legs III and IV. Pedipalps: femur pentacarinata, carinae moderately marked; patella with eight moderate carinae; all carinae without dark pigmentation. Dorsal trichobothria of femur arranged in  $\beta$ -configuration (VACHON, 1974). Chela smooth, without carinae. Fixed and movable fingers with 11 oblique rows of granules. Chela L/W ratio is 5.57 in the adult male holotype. Mesosoma yellow with three longitudinal moderate carinae without dark strips. Carinae on tergite I and II weakly evident. Only tergite VII has five carinae. Venter yellow with pale yellow genital operculum and pectines. The pectinal marginal tips extend to the proximal end of the fourth sternite. Pectinal teeth count is 31/34 in male holotype (32/32 and 33/33 in two male paratypes, 24/25 in female allotype and 23-27 in the four female paratypes). Sternum triangular, longer than wide. Sternites smooth except for sternite VII which bears four carinae. Other sternites show two vestigial furrows. Spiracles elongated. Metasoma with all its segments longer than wide; segment I with 10 complete moderate carinae; segments II and III with 10 carinae but lateral carinae incomplete and ventral carinae with several bigger granules (more evident in females); segment IV with eight

carinae; segment V with five carinae, with tubercles of latero-ventral carinae marked. Anus with two lateral lobes. Telson almost smooth except for some ventral granules. Vesicle and base of aculeus yellowish. End of aculeus reddish. Aculeus curved and shorter than vesicle. Subaculear tubercle not noticeable.



Figs 5-13. Female paratype (MSNB) of *Buthus karoraensis* sp. n. Carapace (5). V metasomal segment and telson, lateral and ventral view (6-7). Chela, lateral and dorsal view (8-9). Movable finger of pedipalp (10). Patella, dorsal and lateral view (11-12). Femur, dorsal view (13). Note that the trichobothria are indicated by blue points.

### Relationships

*Buthus karoraensis* sp. n. can be readily distinguished by the only other known *Buthus* species in Sudan, *B. brignolii* Lourenço, 2003, by a combination of characters: I) pedipalps yellow, in contrast to yellow pedipalps with a dark reticulation; II) bigger size, with females reaching 60 mm in total

length against only 39 mm; III) reduced number of pectinal teeth in females, 23-27 in contrast to 28-29; IV) different morphometric ratios, such as the L/W ratio of pedipalp chela which is 4.3-4.5 in the females of *B. karoraensis* sp. n. and 5 in the female of *B. brignolii*.

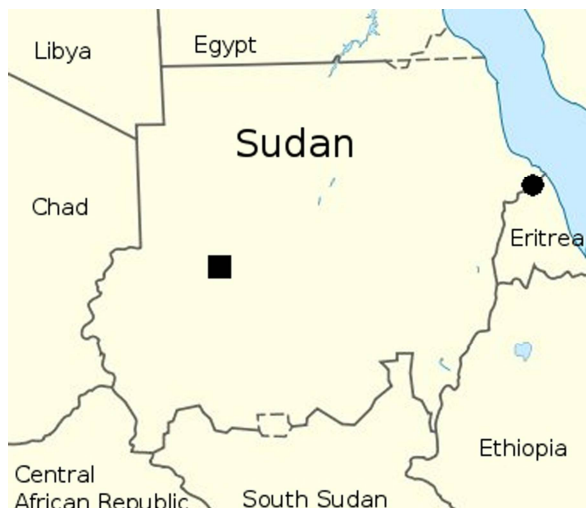


Fig. 14. Map of Sudan with the type localities of *Buthus brignolii* Lourenço, 2003 (square) and *Buthus karoraensis* sp. n. (circle).

	<i>Buthus karoraensis</i> sp. n. ♂ holotype MZUF	<i>Buthus karoraensis</i> sp. n. ♀ allotype MZUF	<i>Buthus brignolii</i> Lourenço, 2003 ♀ holotype MHNG
Carapace L/posterior W	5.56/5.18	6.45/6.96	4.58/5.31
Mesosoma L	15.34	18.60	11.40
I metasomal segment L/W	4.00/3.49	4.20/3.98	2.99/2.78
II metasomal segment L/W	4.52/3.32	4.78/3.87	3.18/2.66
III metasomal segment L/W	4.72/3.13	4.90/3.73	3.53/2.64
IV metasomal segment L/W	5.31/3.02	5.79/3.51	4.28/2.66
V metasomal segment L/W	6.17/2.91	6.47/3.80	4.86/2.58
Telson L/W/H	5.32/2.13/2.12	6.09/2.79/2.60	4.22/2.06/-
Aculeus L	2.60	2.49	1.71
Chela L/W	8.24/1.48	9.90/2.28	7.29/1.45
Total L	50.94	57.28	39.04

Table 1. Measurements of *Buthus karoraensis*, male holotype (MZUF) and female allotype (MZUF), and of *Buthus brignolii*, female holotype (MHNG).

### Discussion

The genus *Buthus* in East-Africa remains little known and more undescribed species may be present. Some old records such as that reported by BORELLI (1925) are erroneous. In fact very recently the

status of *Buthus insolitus* Borelli, 1925 from Somalia, regarded as *nomen dubium* by KOVAŘÍK (2003), was resolved by ROSSI (2015), who moved the species to the genus *Gint* Kovařík, Lowe, Plíšková & Štáhlavský, 2013. The status of some populations of *Buthus* from East-Africa remains unclear and more studies are necessary to clarify their taxonomical position and validity.

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