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## A NEW SPECIES OF THE GENUS *BUTHUS* LEACH, 1815 FROM EGYPT (SCORPIONES: BUTHIDAE)

**ABSTRACT** - A new species of the genus *Buthus* Leach, 1815 is described from northern Egypt, near to the Mediterranean coast. *Buthus adrianae* sp. n. shows morphological and geographical affinity with *Buthus orientalis* Lourenço & Simon, 2012 recorded from Alexandria. A discussion about the distribution of the species of the genus *Buthus* in Egypt and an identification key are also proposed.

**RIASSUNTO** - Una nuova specie egiziana del genere *Buthus* Leach, 1815 (*Scorpiones: Buthidae*).

Viene descritta una nuova specie del genere *Buthus* Leach, 1815 su materiale proveniente dall'Egitto settentrionale presso le coste mediterranee. *Buthus adrianae* sp. n. mostra affinità morfologiche e geografiche con *Buthus orientalis* Lourenço & Simon, 2012 descritto di Alessandria. Viene inoltre proposta una chiave dicotomica per il riconoscimento dei *Buthus* presenti in Egitto e discussa la distribuzione delle specie.

**KEY WORDS:** *Buthus*, new species, Egypt, Sinai, distribution.

### INTRODUCTION

The first systematic revision of the genus *Buthus* Leach, 1815 was proposed by Vachon (1952) in his monography about North African scorpions. Although he recognized many subspecies and even varieties within the genus, several populations remained unknown or totally undescribed. Only in the recent years, Lourenço (2002; 2003) tried to better understand the real status of many subspecies and varieties from Africa with the result that he elevated them to species or described the unknown populations as new species. More attention focused on the genus *Buthus* led to the description of other new species, especially from Morocco (Lourenço & Slimani, 2004; Lourenço & Geniez, 2005; Lourenço & Qi, 2006; and more recently, Touloun & Boumezzough, 2011; Lourenço, Touloun & Boumezzough, 2012), which hosts the highest variability within *Buthus*, but also from Tunisia and Ethiopia (Kovářík 2006; 2011) and Saharan and Sub-Saharan regions (Lourenço 2005a,b,c; Lourenço, Sun & Zhu, 2009; Lourenço & Leguin, 2012; Lourenço, Duhem & Cloudsley Thompson, 2012). Some changes affected also Asian *Buthus* (Lourenço, 2008; Lourenço, Yağmur & Duhem, 2010; Yağmur, Koç & Lourenço 2011), with three new species, and European *Buthus* with four new species, mainly from Spain (Lourenço & Vachon, 2004; Rossi, 2012), but surprisingly also from Italy (Lourenço & Rossi, in press). As a consequence, the type species *Buthus occitanus* (Amoreux, 1789) was limited only to southern France and eastern Spain. Although the *Buthus* populations of many countries were intensely studied, some large territories seem still not sufficiently explored. This is the case of Egypt, from only recently two populations were described as new species (Lourenço & Cloudsey-Thompson, 2012; Lourenço & Simon, 2012) and Libya, with a new addition (Rossi, Tropea & Yağmur, in press). With the description of *Buthus adrianae* sp. n. the number of Egyptian *Buthus* is now raised to five according to Fet & Lowe (2000) and the further publications, although this number is controversial as explained below.

## MATERIALS AND METHODS

Specimens were photographed using a Nikon D50 camera. Digital images were edited with the assistance of Gimp 2.6 and Adobe Photoshop.

Descriptions and measurements (given in mm) mostly follow respectively Hjelle (1990) and Sissom, Polis & Watt (1990). The measurement of metasomal segment width is as illustrated in Vachon (1952).

ABBREVIATIONS: L = length; W = width; H = height. ARPC = Andrea Rossi Private Collection, Italy; MSNB = Museo Civico di Scienze Naturali di Bergamo "E. Caffi", Italy; ZMBH = Museum für Naturkunde der Humboldt-Universität Berlin, Germany.

## TAXONOMY

Family Buthidae Koch, 1837

Genus *Buthus* Leach, 1815

### *Buthus adrianae* sp. n.

TYPE MATERIAL: El-Hamam, about 70 km south-west of Alexandria, Egypt. (30° 49' 48" N, 29° 18' 54" E), 1 adult ♂ holotype (14011-MSNB) and 1 adult ♂ paratype and 1 adult ♀ paratype (ARPC), leg. Bernd Cavelius, March 2009.

ETYMOLOGY: name in honour of Mrs. Adriana Ratto Politi who financed this research.

DIAGNOSIS: species of medium to large size in relation to the known species of the genus, with a maximum length of 70 mm in males and of 68 mm in female (see measurements). General coloration yellowish-brown with tergites and posterior part of carapace darker (dark-brown to blackish). Sternites dark brown. Carinae rather marked on carapace and moderately marked on tergites and metasomal segments (See fig. 1-2). Movable and fixed fingers with 10 rows of granules. Pectines with 27-31 teeth in males and 23-24 in female.

DESCRIPTION: based on male holotype (fig. 1a, c).

Coloration: carapace basically brown with darker carinae; tergites dark brown to blackish with carinae black and two brown (lighter) longitudinal stripes; only tergite VII laterally is yellowish-brown; sternites light brown; metasoma, telson, pedipalps and legs uniformly yellowish-brown; several small brown spots on legs and rarely on pedipalps; aculeus black; pectines and genital operculum yellowish-brown.

Prosoma: carapace with moderately marked anterior median carinae; central lateral and posterior carinae strongly marked, forming the typical lyre configuration of the genus *Buthus*. Median eyes dark brown and separated by two ocular diametres; three pairs of small lateral eyes black. Carinae dark brown.

Mesosoma: tergites I to VI with three moderate longitudinal carinae. Tergite VII with five carinae strongly marked, only the lateral moderately marked. Tergites with two longitudinal stripes of light colour between median and lateral carinae. Sternites smooth except for

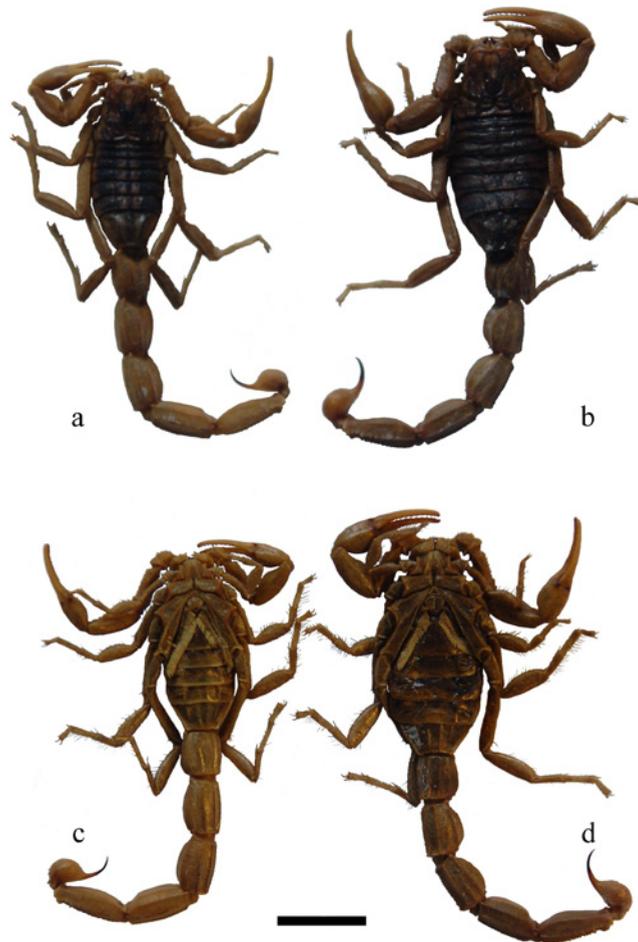


Fig. 1. *B. adrianae* sp. n. a) dorsal view of male holotype, b) dorsal view of female paratype, c) ventral view of male holotype, d) ventral view of female paratype. Scale bar = 10 mm.

sternite VII which bears four carinae and sternite VI which bears two vestigial carinae. Other sternites show two vestigial furrows. Spiracles elongated.

Metasoma: very elongated with all segments longer than their wide; length/width ratio of V metasomal segment about 2.24; segment I with 10 complete carinae; segments II and III with 10 carinae but lateral carinae incomplete and ventral carinae smooth; segment IV with eight carinae; segment V with five carinae, with tubercles of latero-ventral carinae moderately marked. The intercarinal spaces are finely granulated. Anus with two lateral lobes. Telson almost smooth with few hairs; vesicle relatively small and flat; aculeus curved and very long,

about as long as vesicle; subaculear tubercle not noticeable.

Chelicerae: yellow, not reticulated, with black teeth; typical dentition of family Buthidae, as defined by Vachon (1963): external distal and internal distal teeth approximately the same length; basal teeth on movable finger small and partially fused; ventral aspect of both fingers and manus covered with long dense setae.

Pedipalps: femur (fig. 2b) pentacarinata with moderately carinae; patella (fig. 2a) with eight moderate carinae; only carinae of patella with darker pigmentation. Dorsal trichobothria of femur arranged in  $\beta$ -configuration. Chela smooth, without carinae. Movable fingers with 10 oblique rows of granules with one internal and one external granule and three distal granules; fixed finger with 10 oblique rows of granules. Chela relatively narrow with length/width ratio of 4.47.

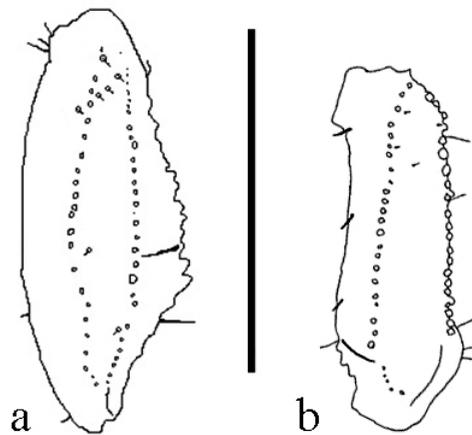


Fig. 2. *B. adrianae* sp. n. male holotype. a) dorsal view of patella of left pedipalp, b) dorsal view of femur of right pedipalp. Scale bar = 5 mm.

Chaetotaxy: oligotrichous as defined by Vachon (1952).

Legs: coxa, femur and patella with moderate carinae and densely hirsute; tarsus with two ventral longitudinal rows of setae. Robust tibial spurs present on legs III and IV. Pedal spurs present on legs I to IV.

Pectines, genital operculum and sternum: pectinal teeth count is 27-30 in male holotype, 31-31 in male paratype and 24-23 in female paratype. Genital operculum wide and lobate; split in two parts. Sternum triangular, about as long as wide.

Measurements: Male holotype: carapace length and posterior width 7,31/7.42; mesosoma length 13.34; I metasomal segment L/W 6,11/5,18; II metasomal segment L 6,91; III metasomal segment L 7.29; IV metasomal segment L 8.31; V metasomal segment L/W 8,92/3,98; telson L/W/H 7,29/3,22/2,89; aculeus L 3,57; chela L/W/H 11,23/2,51/2,79; total length 65,48.

Female paratype (fig. 1b, d): carapace length and posterior width 8,21/9,27; mesosoma length

15,93; I metasomal segment L/W 5,78/5,21; II metasomal segment L 6,64; III metasomal segment L 6,85; IV metasomal segment L 7,96; V metasomal segment L/W 9,24/4,36; telson L/W/H 8,25/3,73/3,31; aculeus L 4,17; chela L/W/H 13,17/3,47/3,81; total length 68,86.

RELATIONSHIPS: *Buthus adrianae* sp. n. is closely related to *Buthus orientalis* Lourenço & Simon, 2012, described from Alexandria. However it can be distinguished by 1) ventral carinae on second and third metasomal segment totally smooth; 2) sternite VI without four carinae; 3) a slightly reduced number of pectinal teeth in female; 4) a relatively small and flat vesicle; 5) aculeus very long (almost as long as vesicle in males and longer than vesicle in female); 6) tergites very dark, with two lighter longitudinal stripes.

### DISCUSSION ON *BUTHUS* DISTRIBUTION IN EGYPT

Five valid species of the genus *Buthus* are presently recognized in Egypt: *Buthus intumescens* (Ehrenberg, 1829), *Buthus israelis* (Shulov & Amitai, 1959), *Buthus egyptiensis* Lourenço & Cloudsey-Thompson, 2012, *Buthus orientalis* Lourenço & Simon, 2012 and *Buthus adrianae* sp.n.; among them, the status of two species is controversial. *Buthus intumescens* was described based on a single female from Egypt, without a precise locality. The old holotype is still present in ZMBH and was recently studied by Kovařík (2006) who elevated it to species status while previously it was synonymized by Gervais (1844) with *Buthus occitanus tunetanus*, now *Buthus tunetanus* (Herbst, 1800). Kovařík (2006), studying also several *Buthus* specimens from Israel (possibly *Buthus israelis*) and the holotype of *Buthus intermedius* (Ehrenberg, 1829) from Yemen, also deposited in ZMBH, considered both synonyms of *Buthus intumescens* since he was not able to find any difference. However, later Lourenço (2008) formally maintained the validity of *B. intermedius* and subsequently also *B. israelis* was restored by Lourenço *et al.* (2010), and followed by Yağmur *et al.* (2011). According to Levy & Amitai (1980), the known localities of *B. israelis* are only in Israel and Sinai Peninsula (Asian part of Egypt) whereas there are no records from the African part of Egypt. Although the exact type locality of *B. intumescens* is unknown since Ehrenberg (1829) cited only Egypt, I suspect that it could come from the Upper Egypt where Hemprich and Ehrenberg went in 1821-1823 according to Fet & Braunwalder (1998). The populations of *Buthus* from Lower Egypt have 10 oblique rows of granules on pedipalp movable finger whereas the populations from Sudan, Ethiopia, Eritrea and Somalia have generally 11 rows (except *B. brignolii* Lourenço, 2003 from Darfur, which has 10 rows), as *B. intumescens*.

According to Levy & Amitai (1980), in *Buthus israelis* the metasomal segment I is always wider than long, and besides in females also the metasomal segment II is usually wider than long. However, in the female holotype of *B. intumescens* the metasomal segments I and II are clearly longer than wide.

Ratios of metasomal segments (and pedipalps) are very important in the taxonomy of *Buthus*. According to Kovařík (2006), the female holotype of *B. intumescens* also has a narrow chela of pedipalp. In *B. israelis* the females have wider chela than the males. For both reasons, I am convinced that *B. intumescens* and *B. israelis* are valid and different species. Regarding the distribution of the three species from Lower Egypt, they are known only from the respective type localities (fig. 3).

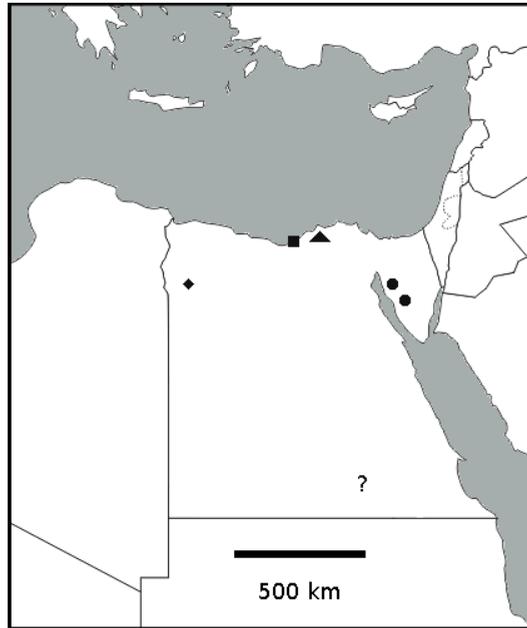


Fig. 3. Map of distribution of Egyptian *Buthus*: square = *B. adrianae* sp. n.; triangle = *B. orientalis*; circle = *B. israelis*; rhombus = *B. egyptiensis*; question mark = possible locality of *B. intumescens*.

#### IDENTIFICATION KEY OF THE EGYPTIAN *BUTHUS*:

- |  |   |
|--|---|
| 1. movable finger of pedipalp chela with 11-13 rows of granules .....  | 2 |
| - movable finger of pedipalp chela with 10 rows of granules .....  | 3 |
| 2. first and second metasomal segment longer than wide .....   |   |
| ..... <i>B. intumescens</i> (Ehrenberg, 1829)  |   |
| - first (and in females usually also second) metasomal segment wider than long .....   |   |
| ..... <i>B. israelis</i> (Shulov & Amitai, 1959)   |   |
| 3. large size (over 85 mm in total length) .....   |   |
| ..... <i>B. egyptiensis</i> Lourenço & Cloudsey-Thompson, 2012   |   |
| - medium size (up to 70 mm in total length) .....  | 4 |
| 4. ventral carinae on second and third metasomal segment strongly lobate; tergites yellowish with a darker longitudinal stripe; vesicle strongly globular and aculeus shorter than vesicle ..... |   |
| ..... <i>B. orientalis</i> Lourenço & Simon, 2012  |   |
| - ventral carinae on second and third metasomal segment smooth; tergites blackish with two lighter longitudinal stripes; vesicle small and flat; aculeus about as long as vesicle .....          |   |
| ..... <i>B. adrianae</i> sp. n.  |   |

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