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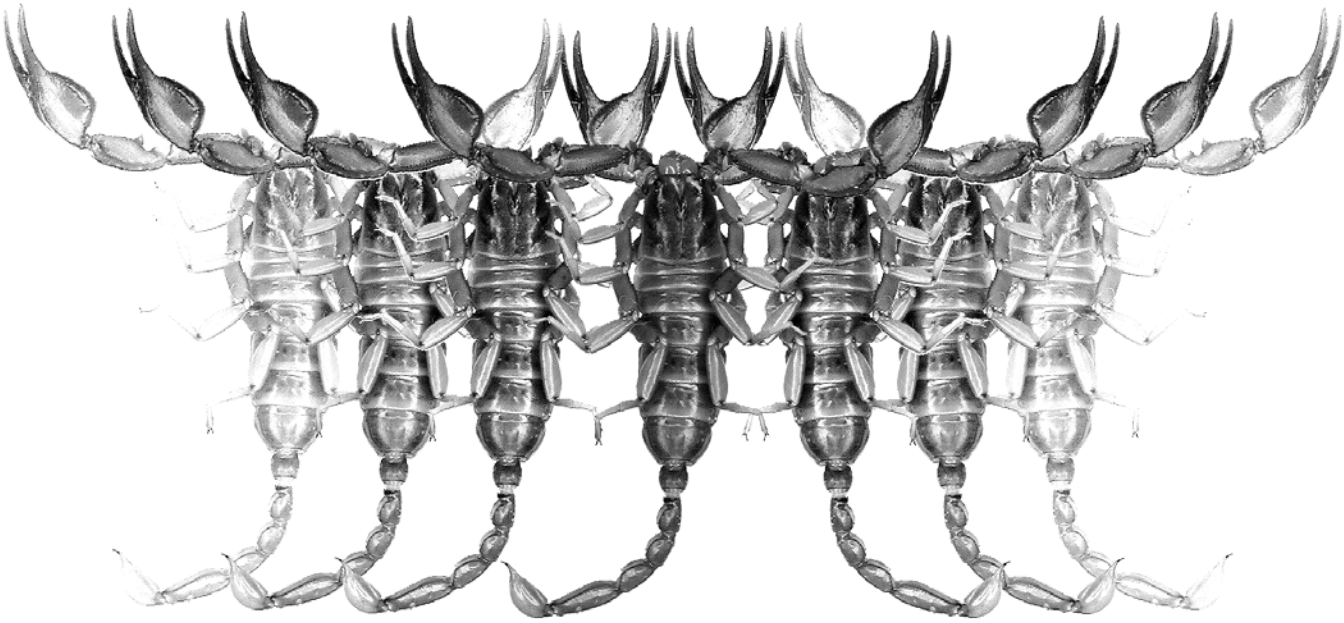

A New Scorpion Species of the Genus *Buthus* Leach, 1815 (Scorpiones, Buthidae) from Morocco

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A new scorpion species of the genus *Buthus* Leach, 1815 (Scorpiones, Buthidae) from Morocco

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Summary

A new species belonging to the genus *Buthus* Leach (Scorpiones, Buthidae) is described from northeast of Tarfaya in the extreme southwest of Morocco. The new species does not belong to the "*Buthus occitanus* species complex", but is rather associated with *Buthus atlantis* Pocock, species also known from the southern of Morocco. With the description of *Buthus bonito* sp. n., the number of known species of *Buthus* present in Morocco is raised to 12. A checklist of these species is provided.

Introduction

As already explained in several previous papers (Lourenço, 2002, 2003, in press; Lourenço & Slimani, 2004) the taxonomy of the genus *Buthus* Leach has remained complex and confused for a long while. In a series of publications, concluded in a monograph about North African scorpions, Vachon (1952) attempted to establish a better definition of the genus and transferred several species, which previously belonged to it, to other genera (see Lourenço, 2003, for details). The classification proposed by Vachon (1952) for the species of *Buthus*, and in particular for *Buthus occitanus* 'complex' remained unsatisfactory, however, mainly because of the existence of several poorly defined subspecies and even varieties (although the latter category is not accepted by the International Code of Zoological Nomenclature, Article 45).

Only recently, a more precise definition of the *Buthus* species has been attempted by Lourenço (2002, 2003) and Lourenço & Slimani (2004), with the description of several new species and the promotion of some subspecies to species rank. Even if these contributions clarified the status of several species of *Buthus*, in particular from Morocco, the status of other species remains confusing.

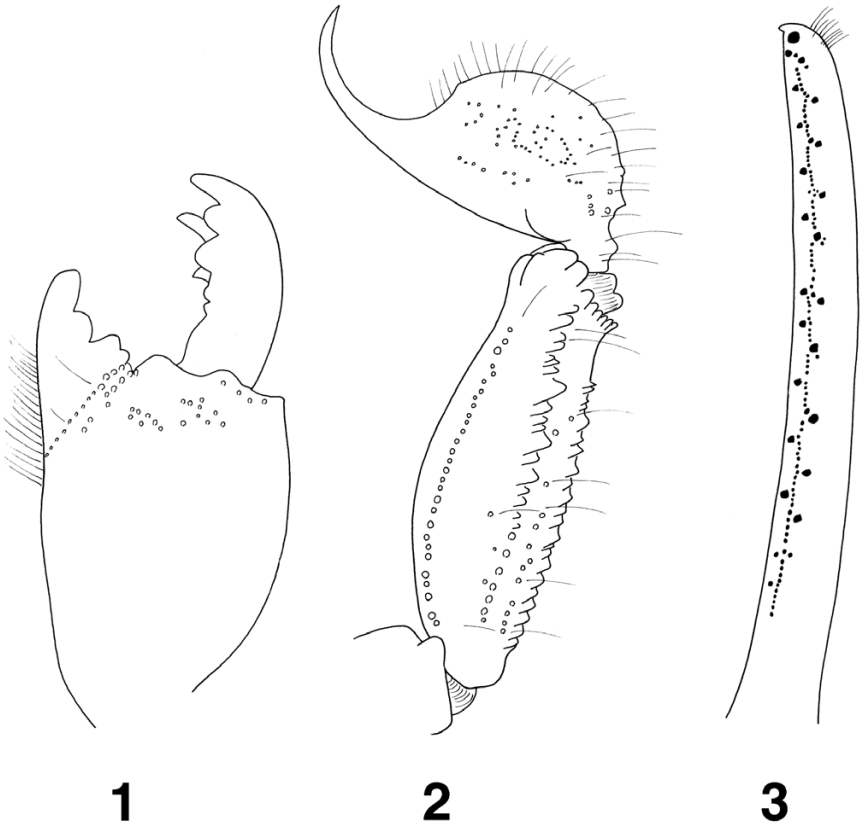
This is still the case of several *Buthus* populations from the sub-Sahara (Sahel) regions of Africa, distributed mainly from Senegal to Niger and Sudan. Vachon (1949, 1952) referred to these populations as *Buthus occitanus* but without any reference to a precise subspecies. In a recent study (Lourenço, in press), I was able to locate some well preserved specimens of *Buthus* from Guinea and Senegal, and a new species was described for this population. The interesting surprise was the fact that this new species was not associated with *Buthus occitanus* as suggested by Vachon (1949, 1952), but rather with *Buthus atlantis* Pocock, species known only from the south of Morocco. The description of this new species clarified the status of at least one population from the Sahel.

In the present paper, another new species of *Buthus*, also associated with *Buthus atlantis* is described from the extreme southwest of Morocco. One interesting point is the fact that specimens from this *Buthus* population were not collected before, and it never had being the subject of any study or comments in any previous publication.

Buthus bonito sp. n. (Figs. 1–10)

Type material. Morocco, northeast of Tarfaya, near to the Khnifiss lagoon, 31/V/2004 (M. Aymerich leg.); 1 male holotype, 2 female paratypes*. Deposited in the Muséum national d'Histoire naturelle, Paris.

* female specimens are still alive. They will be subsequently deposited in the Muséum's collections after biological observations.



Figures 1–3: *Buthus bonito* sp. n. Male holotype. **1.** Chelicera, dorsal aspect. **2.** Metasomal segment V and telson, lateral aspect. **3.** Granulation on the dentate margins of the pedipalp chela movable finger.

Etymology. The name 'bonito' (beautiful in Spanish), makes reference to the beautiful color of the new species. Curiously, Spanish still is one of the European languages used in the extreme southwest of Morocco, an area corresponding to a part of the former Spanish Sahara.

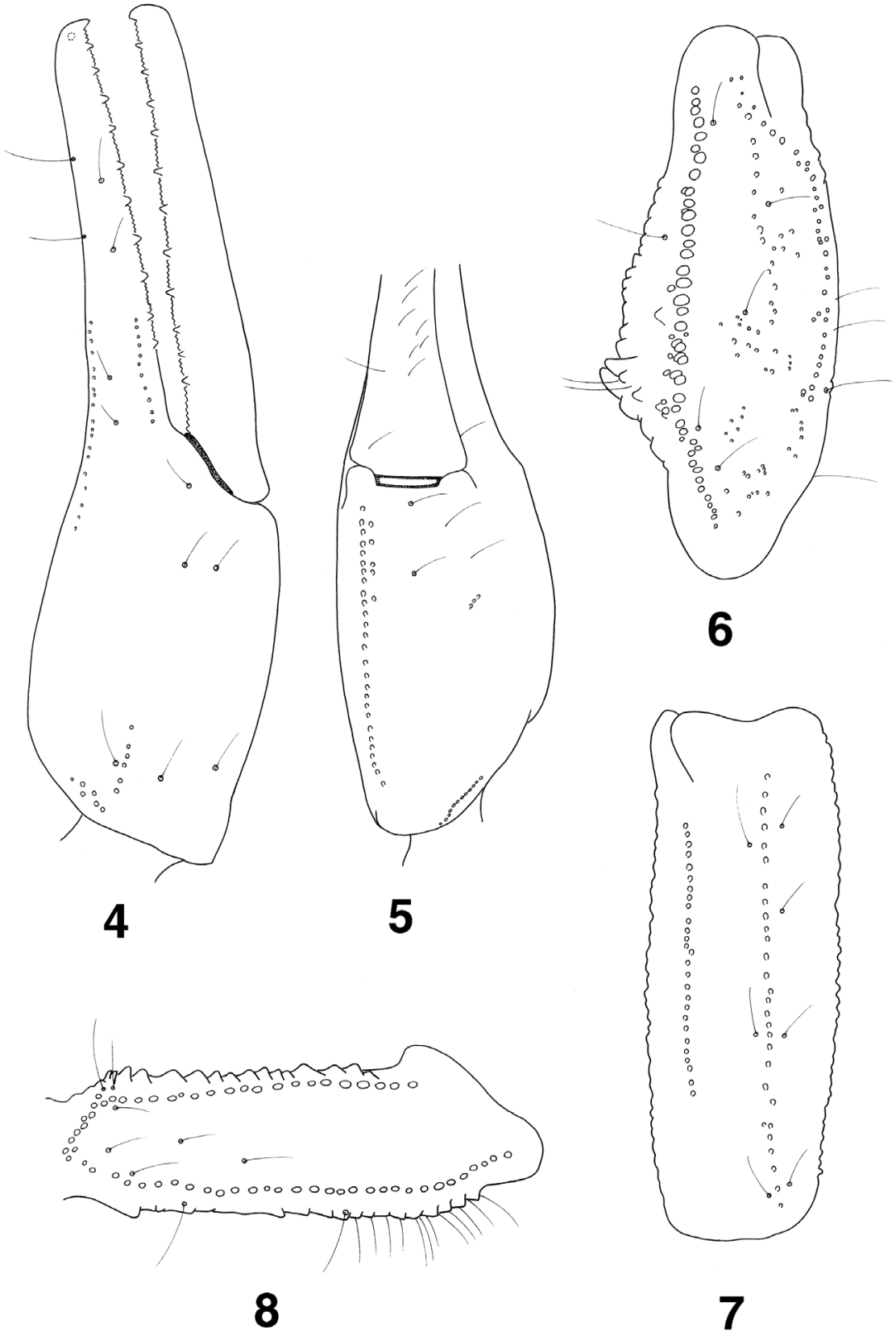
Diagnosis

Scorpions of medium size, reaching a total length of 50 to 55 mm. General coloration very pale yellow, with only some slightly darker zones over the carapace and median carina of tergites, chelicera finger denticles, oblique rows of granules on pedipalp fingers and extremity of aculeus. These parts are blackish in juveniles that exhibit a more contrasted pattern than that of *Buthus atlantis*. Venter, pedipalps and legs very pale yellow. Carinae and granulations moderate to weak. Fixed and movable fingers with 10–11 rows of granules in both sexes. Pectines with 34–33 teeth in male and 29–29 and 34–34 in females. Male pectines very long and largely overlapping in their proximal region.

Description based on male holotype (measurements in Table 1)

Coloration. Basically very pale yellow, with only some slightly darker zones over the carapace and median carina of tergites, chelicera finger denticles, oblique rows of granules on pedipalp fingers and extremity of aculeus. Prosoma: carapace yellowish, with carinae slightly dark brown; eyes surrounded by black pigment. Mesosoma: tergites yellowish; median carina brownish. Metasoma: all segments and vesicle yellowish; aculeus yellowish at its base and blackish at its extremity. Venter pale yellow. Chelicerae yellowish without any variegated spots; fingers yellowish with reddish to blackish teeth. Pedipalps: yellowish; fingers with the oblique rows of granules dark reddish to blackish. Legs yellowish without any spots.

Morphology. Carapace moderately granular; anterior margin with a very weak concavity, almost straight. Carinae moderate; anterior median, central median and posterior median carinae moderately granular; 'lyre' configuration can, however, be well observed. All furrows moderate. Median ocular tubercle at the centre of carapace. Eyes separated by two and half ocular diameters. Four pairs of lateral eyes: the first three of moderate size, the last one only vestigial. Sternum very small and triangular, wider than long. Mesosoma: tergites with a thin but intense granulation. Three longitudinal carinae; lateral carinae absent in tergites I and II; vestigial on III and reduced on IV to VI. Tergite VII pentacarinate. Venter: genital operculum divided longitudinally, and formed by two semi oval plates. Pectines: pectinal tooth count 34–33 in male holotype, and 29–29, 34–34 in female paratypes; middle basal lamella of the pectines not dilated in both sexes. Sternites smooth, with elongated spiracles; four carinae on sternite VII; other sternites without carinae and with two weak furrows. Me-



Figures 4–8: *Buthus bonito* sp. n. Male holotype. Trichobothrial pattern. **4–5.** Chela, dorso-external and ventral aspects. **6–7.** Patella, dorsal and external aspects. **8.** Femur, dorsal aspect.

Figure 9: Map of Morocco, showing the site where the new species was collected (black star).

Total length	54.6
Carapace:	
- length	6.3
- anterior width	4.5
- posterior width	7.2
Metasomal segment I:	
- length	4.5
- width	4.2
Metasomal segment V:	
- length	7.7
- width	3.1
- depth	2.6
Vesicle:	
- width	2.8
- depth	2.8
Pedipalp:	
- Femur length	5.3
- Femur width	1.7
- Patella length	6.0
- Patella width	2.3
- Chela length	10.5
- Chela width	2.4
- Chela depth	2.4
Movable finger: length	6.8

Table 1: Morphometric values (in mm) of the male holotype of *Buthus bonito* sp. n.

tasoma: segments I to III with 10 moderately crenulated carinae, ventral more strongly marked on segments II and III; segment IV with 8 moderately crenulated carinae; segment V with five carinae; the ventrolateral carinae crenulate with 2/3 lobate denticles posteriorly; ventral median carina not divided posteriorly; anal arc composed of 9–10 ventral teeth, and two lateral lobes. All segments with a smooth dorsal depression; intercarinal smooth granular, except for the lateral and ventral aspects of segment V which presents a very thin granulation. Telson, vesicle globular with some very thin granulations on the lateral and ventral surfaces; aculeus strongly curved, and shorter than the vesicle; subaculear tooth absent. Cheliceral dentition as defined by Vachon (1963) for the family Buthidae; external distal and internal distal denticles of approximately the same length; basal denticles of movable finger small but not fused; ventral aspect of both fingers and manus covered with long dense setae. Pedipalps: femur pentacarinate; patella with eight carinae; chela smooth with only vestigial carinae on ventral surface; all faces weakly granular to smooth. Fixed and movable fingers with 10–11 oblique rows of granules. Internal and external accessory granules present but moderate to weak; three accessory granules on the distal end of movable finger next to the terminal denticle. Legs: tarsus (telotarsus) with two longitudinal rows of 6–7 long setae ventrally; basitarsus with moderate bristle comb; it is, however, uncertain if the new species could be an exclusively psammophilic element (see habitat comments); tibial spur strong on legs

Figure 10: Juvenile specimen of *Buthus bonito* sp. n. just after molting process in its natural habitat. Note: this specimen was not collected.

III and IV; prolateral spurs moderate to strong on legs I to IV. Trichobothriotaxy: trichobothrial pattern of Type A, orthobothriotaxic as defined by Vachon (1974). Dorsal trichobothria of femur arranged in β-configuration (Vachon, 1975).

Relationships

Buthus bonito sp. n. does not belong to the "*Buthus occitanus* complex of species", but is rather associated with *Buthus atlantis* Pocock. The definition of these groups is based on carinae development. *B. occitanus* related species show very strongly developed carinae, whereas, those associated with *B. atlantis* have moderate to weak carinae. The new species can, however, be distinguished from *Buthus atlantis* by the following characters: (i) in *B. bonito* sp. n. lateral carinae of tergites are very much reduced or absent; (ii) aculeus in *B. bonito* sp. n. is shorter than the vesicle and strongly curved, whereas in *B. atlantis* it is longer than the vesicle and weakly curved (see Lourenço, 2003, Figs. 20 and 24); (iii) anal arc in the new species shows two lobes, whereas in *B. atlantis* three lobes are frequently observed; (iv) adults of *Buthus atlantis* are much bigger in size with 80 to 90 mm in total length; (v) juveniles exhibit a contrasted blackish and yellowish pattern while those of *B. atlantis* present a relatively uniform yellowish coloration.

Check-list of the known *Buthus* species distributed in Morocco

Buthus occitanus (Amoreux, 1889)
Buthus paris (C.L. Koch, 1839)
Buthus mardochei Simon, 1878
Buthus atlantis Pocock, 1889
Buthus maroccanus Birula, 1903
Buthus malhommei Vachon, 1949
Buthus mariefranceae Lourenço, 2003
Buthus rochati Lourenço, 2003
Buthus lienhardi Lourenço, 2003
Buthus albengai Lourenço, 2003
Buthus draa Lourenço & Slimani, 2004
Buthus bonito sp. n.

Habitat of *Buthus bonito* sp. n.

Buthus bonito sp. n. was observed exclusively in the area of the Khnifiss lagoon, situated in the northeast region of Tarfaya. This is a sand area, about 5 km from the ocean, and corresponds to a Saharian stage presenting hot winters. The scorpion was found exclusively under limestone plates which lay on the sand. This species appears to be very abundant in the area and was the only one observed in the nearby area of the Khnifiss lagoon. Only a second species, *Androctonus mauritanicus* (Pocock, 1902), was observed in the region between the Khnifiss lagoon and Tarfaya.

Acknowledgements

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