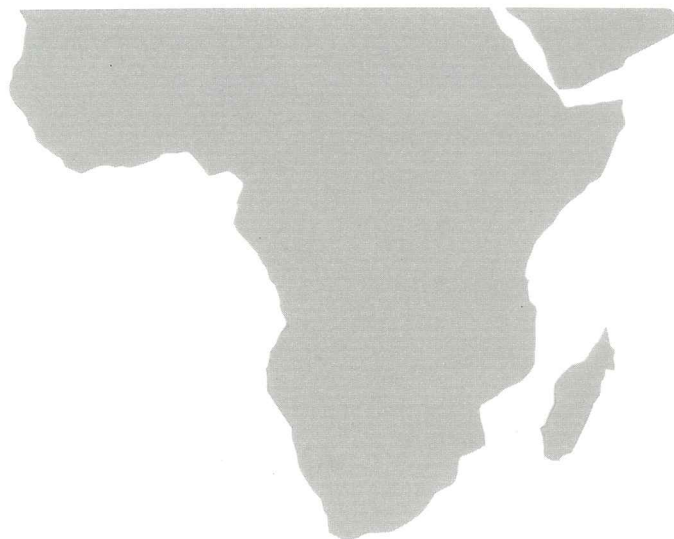


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A new species of *Akentrobuthus* Lamoral, 1976 (Scorpiones: Buthidae) from the Republic of Benin (Western Africa)

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ABSTRACT

VIGNOLI, V. & PRENDINI, L. 2008. A new species of *Akentrobuthus* Lamoral, 1976 (Scorpiones: Buthidae) from the Republic of Benin (Western Africa). *J. Afrotrop. Zool.* 4: 61-70.

More than three decades after the type and only known species of *Akentrobuthus* Lamoral, 1976, was described, a second species of the genus was discovered in a riparian forest in the Republic of Benin, 2600 km from the type locality, in the Democratic Republic of the Congo (DRC, former Zaïre). In the present contribution, the new species, *Akentrobuthus atakora* sp. nov., is described, illustrated and compared with the type species, *Akentrobuthus leleupi* Lamoral, 1976, and the distribution and ecology of both species is discussed.

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Keywords: Buthidae, Akentrobuthinae, *Akentrobuthus atakora* sp. nov., taxonomy, ecology

INTRODUCTION

The Republic of Benin is a small country on the West African coast and shares borders with the Republic of Togo, Burkina Faso, the Republic of Niger and Nigeria. Although only two scorpion species, a buthid, *Hottentotta hottentotta* (Fabricius, 1793), and a scorpionid, *Pandinus imperator* (C.L. Koch, 1841), were previously reported from Benin (Fet & Lowe 2000; Prendini 2004), six scorpion genera and at least six species, in two families, were recorded during a recent fieldtrip to the country (Vignoli *et al.* 2006): *Babycurus kirki* (Pocock, 1890); *Butheoloides* sp.; *Buthus occitanus* (Amoreaux, 1789); *Hottentotta hottentotta*; *Pandinus imperator*; *Scorpio maurus* L., 1758. Special attention was given to the Département du Atakora, in the north-west of Benin, owing to the presence of a large protected area, Parc National de la Pendjari, and the only mountainous area in the country, the Chaîne de l'Atakora. The Chaîne de l'Atakora, with a maximum elevation of *ca.* 500 m a.s.l., is a small formation that extends from north-east to south-west and is directly connected to other mountains in neighbouring Togo. The area has a Sudanian climate (Gilles *et al.* 2006) and is situated in the Dahomey Gap, a region of lowland savannah separating the rainforest that extends from Senegal to the Congo basin (Prendini 2004).

During a nocturnal survey of riparian forest around Tanougou Waterfall (Fig. 1), in the western part of the Chaîne de l'Atakora, at the eastern border of the Parc National de la Pendjari, an interesting buthid scorpion was collected (Fig. 2). The distinctive mor-

phology of this scorpion confirms its identity as a new species of the remarkable genus, *Akentrobuthus* Lamoral, 1976. Prior to the discovery of this new species, the type species, *Akentrobuthus leleupi* Lamoral, 1976, from the rainforests of DR Congo, was based on a series of 17 females collected in the leaf litter at five localities, four (Mutakato, Bunyakiri, Mwenga, Lwiro) in the eastern province of Kivu, and one (Yangambi) further west in Oriental province (Fig. 3).

Lamoral (1976) considered *Akentrobuthus* one of the most enigmatic African buthids because, in his opinion, it shares morphological characters with the families Buthidae C.L. Koch, 1837 and Chactidae Pocock, 1893: subpentagonal sternum; simple pectines without fulcra; two pairs of lateral ocelli; small, suboval respiratory stigmata. This unique character combination led Lamoral (1976) to create a unique subfamily Akentrobuthinae Lamoral, 1976 to accommodate it within the Buthidae. Lourenço (1998) later transferred Akentrobuthinae to a new family of humicolous Malagasy scorpions, Microcharmidae Lourenço 1998, but subsequently returned Akentrobuthinae to Buthidae (Lourenço 2000). The phylogenetic placement of *Akentrobuthus* remains to be determined by phylogenetic analysis.

Considering the limited knowledge of *Akentrobuthus*, the discovery of a new species more than 2600 km from the type locality is very significant. In the present contribution, the new species is described, illustrated and compared with the type species, *A. leleupi*, and the distribution and ecology of both species is discussed.

MATERIAL AND METHODS

The holotype was discovered at night with the use of a portable ultraviolet (UV) lamp. Locality data were recorded with a portable Garmin GPS receiver. The holotype is preserved in 80 % ethanol in the collection of the American Museum of Natural History, New York (AMNH). A leg has been removed from the specimen and stored (in the vapour phase of liquid nitrogen at -150°C) in the Ambrose Monell Collection for Molecular and Microbial Research (AMCC) at the AMNH. Digital photographs of the holotype were taken under long-wave UV light using a Microptics™ ML-1000 digital imaging system. The photos of habitat and live habitus were taken with a Pentax S50. The morphology was observed and measurements taken with a Wild stereoscopic dissecting microscope. Measurements, recorded in millimetres (mm), follow Stahnke (1970) and were taken with an ocular micrometer. Morphological nomenclature follows Vachon (1974) for trichobothrial notation; Hjelle (1990) and Sissom (1990) for the pedipalp segmentation; Soleglad & Fet (2003) for the sternum; Stahnke (1970), Sissom (1990) and Prendini (2000) for remaining features. Colour designation follows Smithe (1974, 1975, 1981). A distribution map was produced using Online Map Creation (OMC, Geomar, <http://www.aquarius.geomar.de>) by superimposing point locality records on country boundaries. Type material of *A. leleupi* examined is deposited in the Royal Museum for Central Africa, Tervuren, Belgium.

SYSTEMATICS

Akentrobuthus atakora sp. n.
Figs 1-17, Table 1

Type material *Holotype* ♀ (AMNH), Republic of Benin: Département du Atakora: Cascade de Tanougou, Chaîne de l'Atakora, Natitingou, 10°48.12'N, 01°26.26'E, 261 m, 9.VI.2005, V. Vignoli & S. Tchibozo, taken at night (UV light detection), from surface of leaf litter in riparian forest.

Etymology The specific name is a noun in apposition, taken from the Chaîne de l'Atakora, the largest mountain range in Benin.

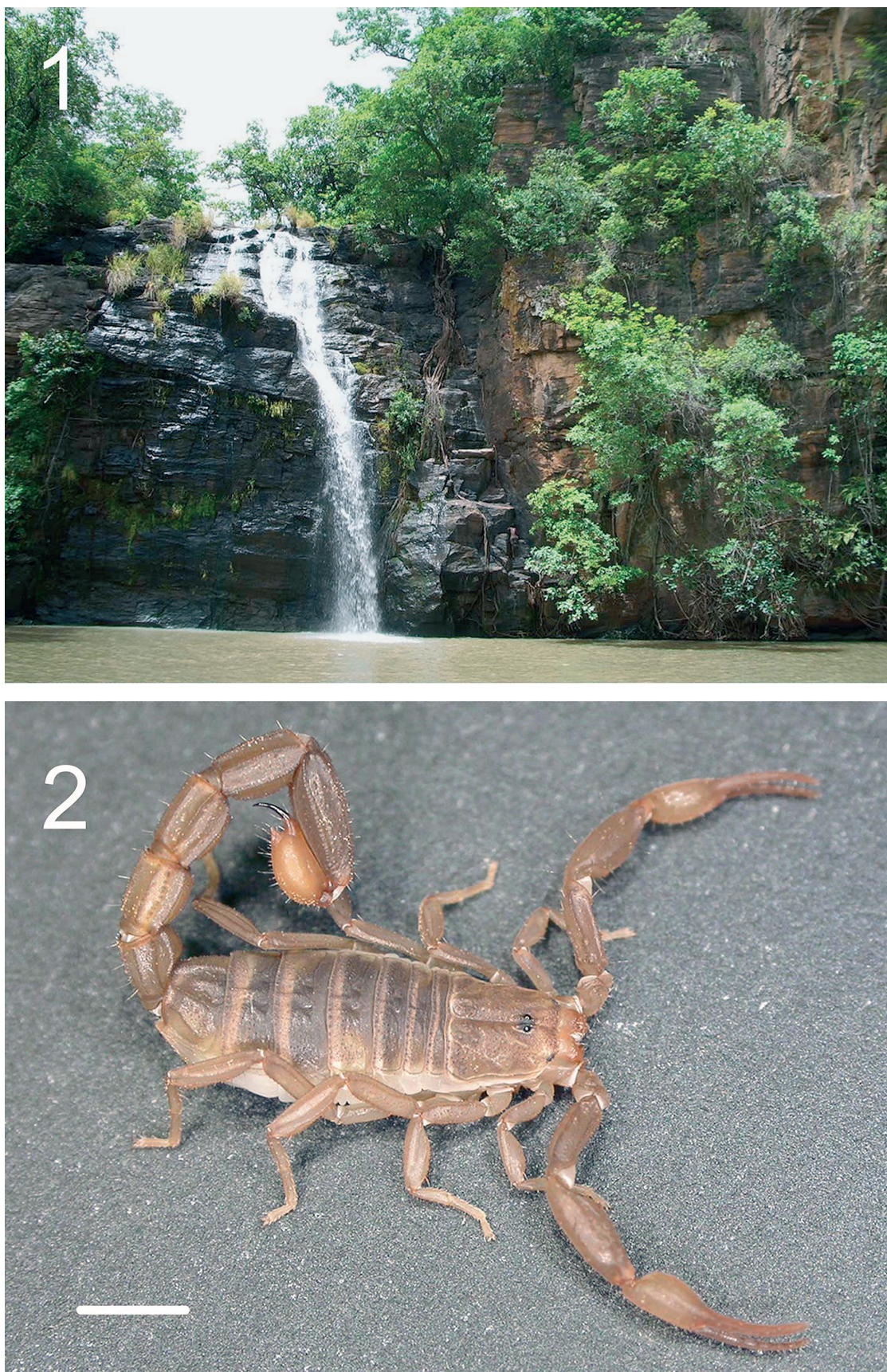
Diagnosis This new species is unequivocally placed in the genus *Akentrobuthus* on the basis of the following combination of characters: trichobothrial pattern Orthobothriotaxic, Type A, β configuration; tibial spurs and pectinal fulcra absent; two pairs of lateral ocelli; subpentagonal sternum; cheliceral movable finger with basal and median teeth reduced; stigmata suboval; prolateral pedal spur acuminate,

with single basal seta; convex transparent lamina present at distal end of pedipalp chela fingers.

In addition to its larger size (Table 1), *A. atakora* may be separated from *A. leleupi* by means of the following characters. The plumose sensory macrosetae on the carapace, pedipalps (femur, patella), pectines, legs and metasoma, characteristic of *A. leleupi*, are absent in *A. atakora*. The basal and median teeth of the cheliceral fixed finger of *A. atakora* are fused, but do not form a bicuspid, as in *A. leleupi*, and the ventral teeth are smaller. The median notch of the carapace is less pronounced in *A. atakora* than in *A. leleupi*. Pedipalp chela trichobothrium Eb_3 is situated dorsally and almost in line with Eb_1 - Eb_2 in *A. atakora*, but is more proximally situated in *A. leleupi*. The granules on the pedipalp coxa and internal surface of the pedipalp femur are more pronounced in *A. atakora* than in *A. leleupi*. The internal surface of the pedipalp chela manus is sparsely granular in *A. atakora* and almost smooth in *A. leleupi*. The sternum of *A. atakora* is more elongated than that of *A. leleupi*. Metasomal segment V is conspicuously narrower posteriorly than anteriorly in *A. atakora*, but less so in *A. leleupi*. The granules on the intercarinal surfaces of the metasoma are smaller in *A. atakora* than in *A. leleupi*. The telson vesicle width is uniform throughout its length in *A. atakora* but decreases posteriorly in *A. leleupi*. The telson of *A. atakora* is less setose than that of *A. leleupi*.

Description *Colour* Carapace orange-brown (C. 123C, Yellow Ochre) with paler spots; mesosomal tergites with medial portions dark brown (C. 223B, Verona Brown), becoming paler laterally. Metasomal segments pale yellow-brown (Yellow Ochre) with darker carinae (Verona Brown); pedipalp femur and patella, as leg segments (Yellow Ochre), except for leg basitarsus and tarsus which are paler (C. 153, Trogon Yellow). Pedipalp chela fingers reddish (C. 132C, Orange Rufous), manus pale yellow (Trogon Yellow). Cheliceral manus as pedipalp chela manus with darker spots, presenting a maculate pattern distally. Aculeus dark reddish (Orange Rufous) like chela finger denticles. Chelicerae and telotarsal ungues darkened distally.

Carapace Posterior width equal to length (Table 1). Anterolateral and posterolateral margins slightly concave. Posterior margin weakly convex, with rounded corners (Fig. 6). Anteromedian sulcus shallow. Posteromedian sulcus deep. Ocular tubercle, superciliary carinae moderately developed. Two pairs of lateral ocelli. Median ocelli situated closer to anterior than to posterior margin and considerably larger than lateral ocelli (Fig. 6). Surface acarinate; unevenly coarsely granular, with smooth areas posterior to median and lateral ocelli. Proximal region of lateral and median ocelli, and posteromedian sulcus



Figures 1-2. *Akentrobuthus atakora* sp. n. 1. Type locality, Republic of Benin: Département du Atakora: Cascade de Tanougou, Chaîne de l'Atakora, Natitingou. 2. Holotype ♀ (AMNH), habitus, in life (scale = 2.2 mm).

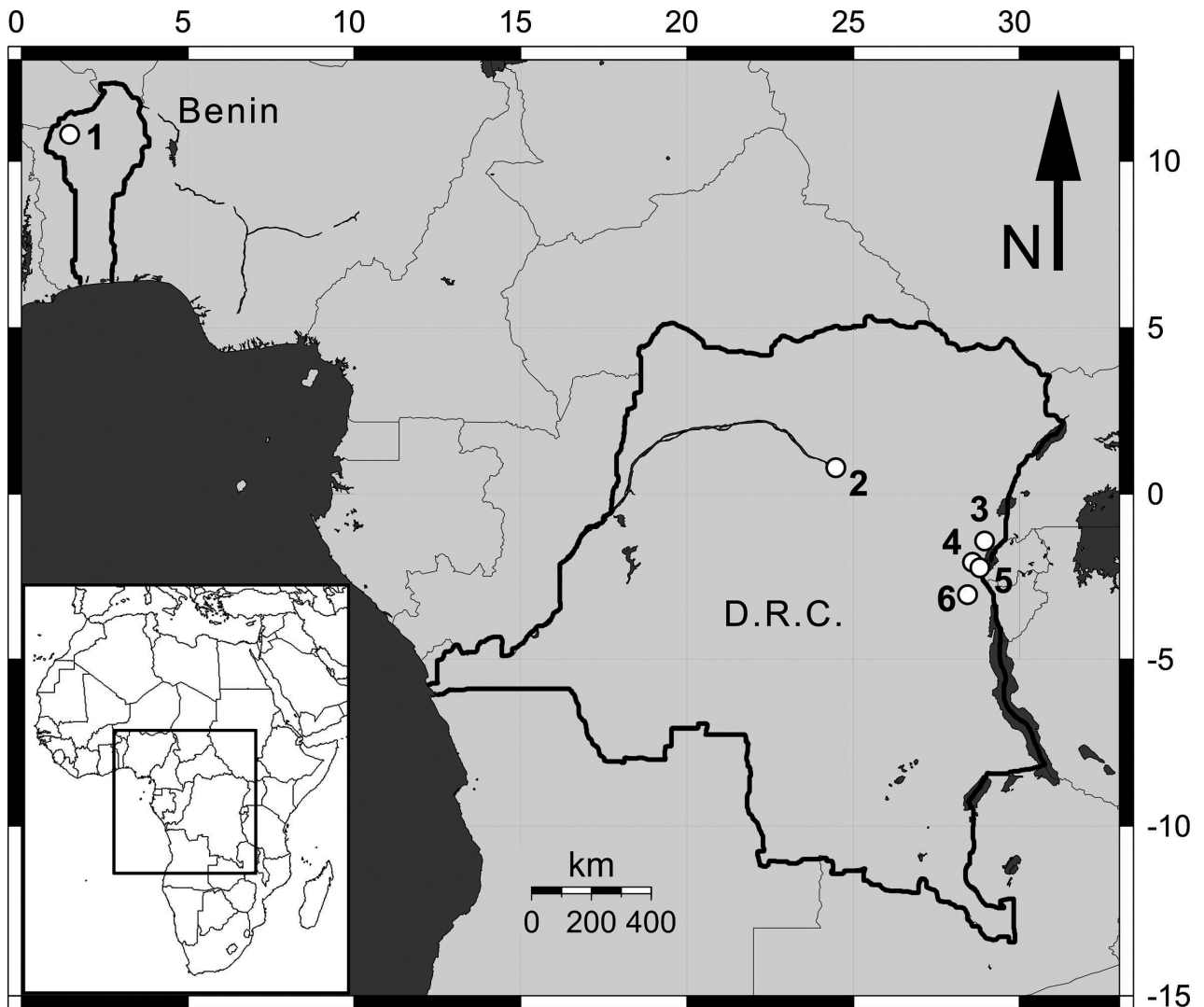


Figure 3. Known distribution of *Akentrobuthus* Lamoral, 1976. Type locality of *Akentrobuthus atakora* sp. n. in Republic of Benin: Cascade de Tanougou (1). Locality records where *Akentrobuthus leleupi* Lamoral, 1976, was collected in the Democratic Republic of the Congo (DRC): Oriental Province: Yangambi (2); Kivu Province: Mutakato (3), Bunyakiri (4), Lwiro (5), Mwenga (6).

partially smooth. Anterior surface and anterolateral margin with small granules. Few, small setae situated on anterior margin and posterior to median ocelli. *Chelicerae* Manus, dorsal proximal and median surfaces smooth, distal surface with several small granules and four macrosetae; ventral surface with several yellow, brush-like macrosetae extending to base of fixed finger. Fixed finger, distal and subdistal teeth distinct; basal and median teeth fused; cutting edge almost straight; ventral surface with two small denticles. Movable finger with three ventral teeth, distal tooth larger than others, and five smaller dorsal teeth, median tooth larger than subdistal tooth; median and basal teeth reduced. Ventral aspect of movable finger with a few long, yellow brush-like macrosetae.

Pedipalps Coxa with sparse macrosetae and large granules, especially on ventral surface. Femur 20 % longer than wide (Table 1); with four distinct carinae (Fig. 8); dorsal surface sparsely granular; external and ventral surfaces, finely granular; internal surface with spiniform granules; few short, transparent microsetae present on all surfaces but sparse on ventral and dorsal surfaces. Patella 35 % longer than wide (Table 1); with five distinct carinae (Figs 9-11); dorsointernal carinae composed of larger spiniform granules; dorsal carinae comprising continuous to discontinuous row of granules, similar in size; intermedian carinae similar to dorsal carinae but composed of smaller granules; dorsoexternal carinae obsolete; ventrointernal carinae granular, similar to

dorsointernal carinae; all surfaces smooth except for internal surfaces, which are granular; setation similar to setation of femur. Chela acarinate (Figs 12-14), entirely smooth with few, stout granules on inner surface of manus (Fig. 14). Manus length similar to width and height (Table 1). Length of movable finger 38 % greater than length of manus. Distal end of chela fingers bearing transparent convex lamina. Dentate margins of fixed and movable fingers each with 6 and 7 denticles, respectively (Fig. 12); first (apical) row very short, sixth row longer than two median rows; each row flanked by single external and single internal accessory denticles; distal denticle present but smaller than accessory denticles. Several short, transparent microsetae present on fingers; few large, reddish macrosetae present on manus.

Trichobothria Orthobothriotaxic, Type A, β configuration (Figs 8-14) with the following segment totals: 11 femur: 5 dorsal (d_1 - d_5), 4 internal (i_1 - i_4), 2 external (e_1 , e_2); 13 patella: 5 dorsal (d_1 - d_5), 1 internal (i), 7 external (et , est , em , esb_1 , esb_2 , eb_1 , eb_2); 8 chela manus: 2 ventral (V_1 , V_2), 6 external (Eb_1 - Eb_3 , Esb , Est , Et); 7 chela fixed finger: dt , db , it , et , est , esb , eb . The following trichobothria are noticeably smaller ('petite'): femur: d_2 , d_3 , d_4 , i_4 , e_2 ; patella: d_2 , eb_2 ; chela manus: V_1 , Et , Eb_3 , Esb ; chela fixed finger: esb .

Mesosoma Tergites, surface similar to carapace, unevenly granular, with granulation increasing towards posterior edge of I-VI; VII uniformly coarsely and sparsely granular. Single median carina present on posterior half of each tergite, vestigial on tergite I, increasing in length from II-VII; submedian carinae absent except on tergite VII, where median lateral and lateral carinae strongly developed (Figs 2, 4). Lateral margins smooth, posterior margins granular. Very short, transparent microsetae present on all tergites. Sternites IV-VI smooth, each with small granules on lateral and posterior margins. Sternite VII with pairs of uniformly weak, granular submedian and lateral carinae. Sternites III and IV, posterior margins straight, V-VII posterior margins slightly concave. Posterolateral margins of sternites rounded. Sternite VII, 52 % wider than long (Table 1). Several macrosetae present on posterolateral margins, especially posteromedially on sternite III. Sternite V with six large reddish macrosetae, two on distal margin and four on median region. Stigmata small, suboval, crescent-shaped (Fig. 7).

Sternum Type 1, elongate subpentagonal (Fig. 7). Apex extremity slightly rounded. Lateral margins and posterior ridge slightly concave (Fig. 7). Posterior depression small and shallow. Two large reddish macrosetae situated in apical region and two in concave depression.

Genital operculum Completely divided longitudinally; all margins rounded. Distal lobes reduced, covering a large triangular opening (Fig. 7).

Pectines All except distal teeth similar in size; distal teeth slightly larger (Fig. 7); tooth count: 8/8. Fulcra absent (Fig. 7). All surfaces covered with transparent microsetae and reddish macrosetae. Basal piece broad and narrow with more than 20 large, reddish macrosetae on medial portion.

Legs Femur and patella of each leg laterally compressed. All segments granular, except for basitarsus and tarsus, which are smooth. Femur with distinct longitudinal dorsal and ventral carinae, except for leg I where only indistinct granulation present; external surfaces with distinct carina and stout granules on intercarinal surfaces. Patella with dorsal and ventral carinae as in femur but composed of smaller granules, except for leg I where only indistinct granulation present; external surfaces with two carinae comprising small granules; intercarinal surfaces smooth. Tibial spurs absent. Prolateral pedal spurs not bifurcated, with single long reddish macroseta. Retrolateral pedal spur present, reduced in leg I. Several short, transparent microsetae on all segments, fewer on ventral surface. Basitarsi and telotarsi with paired ventrosubmedian rows of fine, transparent microsetae, fewer on prolateral and retrolateral margins. Telotarsal laterodistal lobes each with three macrosetae; median dorsal lobe short, bearing a single macroseta. Telotarsal unguis moderately developed, equal in length; median ungue (dactyl) short and broad, slightly reduced in leg I.

Metasoma and telson Metasomal segment I wider than long, segments II-V longer than wide, width/length percentage as follows: 127 % for I, 86 % for II, 80 % for III, 63 % for IV, 39 % for V (Table 1). Segments increasing in length from I-V. Short, transparent microsetae, similar to tergites, on dorsal and lateral surfaces of each metasomal segment. Macrosetae present on ventral and lateral surfaces of each segment. Segments I and II with five pairs of distinct carinae: ventrosubmedian, ventrolateral, median lateral, dorsolateral and dorsosubmedian. Median lateral carinae abbreviated on segment II, absent on segments III-V. Intercarinal surfaces sparsely granular, except for ventral surfaces which are smooth. Dorsal intercarinal surfaces of segments I-IV concave, granular medially; segment V slightly concave, dorsomedian surface smooth; lateral intercarinal surfaces sparsely granular. Segment V with pairs of dorsolateral and ventrolateral carinae, and single ventromedian carina, comprising stout granules equal in size (Fig. 15); ventrosubmedian carinae absent, ventral intercarinal surface with granules arranged in indistinct longitudinal row (Fig. 15); dorsal carination less

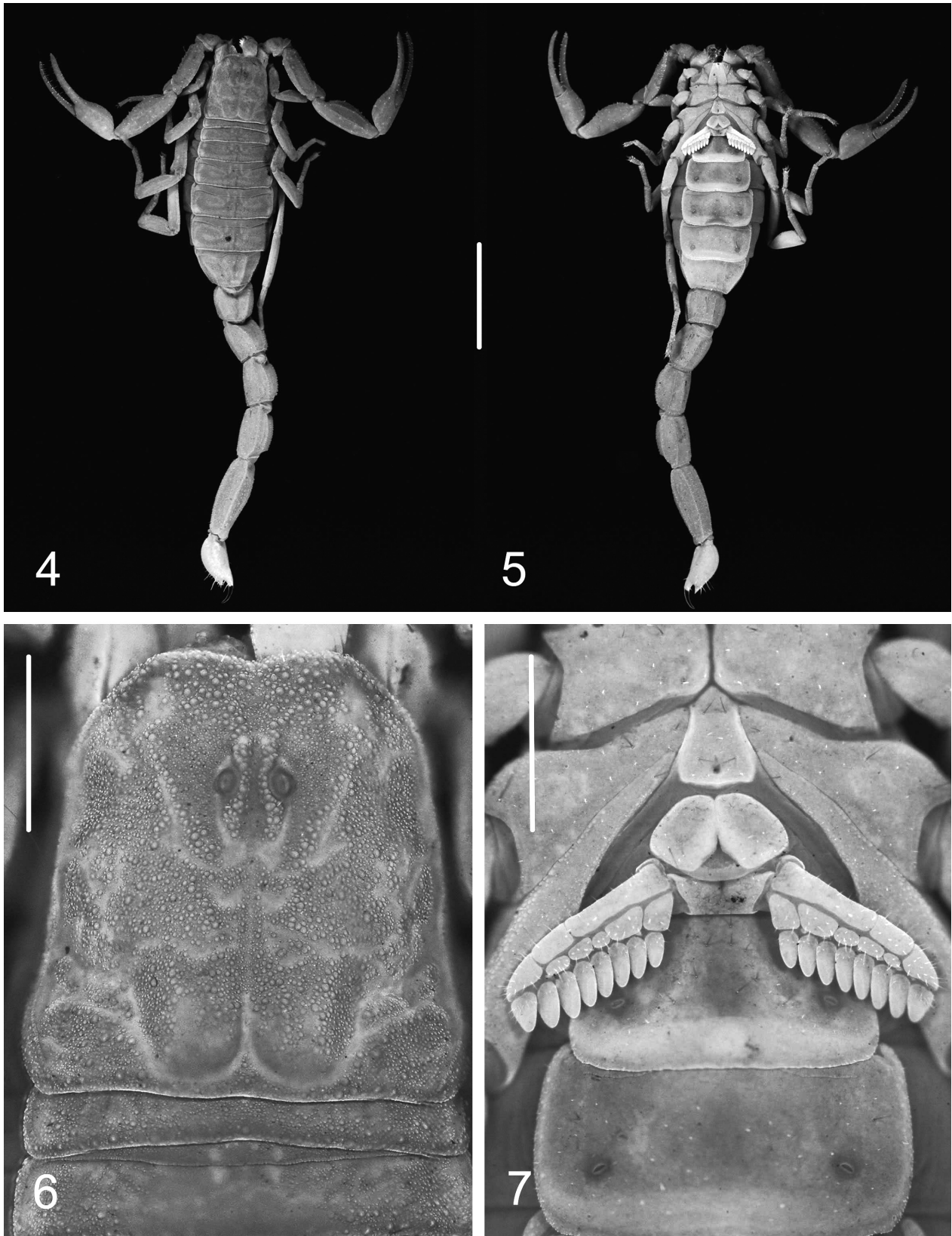
Table 1. Meristic data for *Akentrobuthus atakora* sp. n., holotype ♀ (AMNH), and *Akentrobuthus leleupi* Lamoral, 1976, paratype ♀ (MRAC 75599). ¹Measured from base of condyle to tip of fixed finger. ²Sum of metasomal segments I-V and telson.

Species:		<i>A. atakora</i>	<i>A. leleupi</i>
Specimen:	type sex collection	Holotype ♀ AMNH	Paratype ♀ MRAC
Carapace:	anterior width	1.7	1.3
	posterior width	2.2	1.9
	length	2.2	1.8
Chela:	maximum width	0.8	0.6
	maximum height	0.8	0.6
	length ¹	3.4	2.8
	length of ventroexternal carina	0.8	0.9
Patella:	length of movable finger	2.1	1.8
	maximum width	8.5	0.7
	maximum height	0.7	0.5
	length	2.4	1.9
Femur:	maximum width	0.6	0.5
	maximum height	0.6	0.5
Pedipalp:	length	2.9	1.5
	total length (incl. trochanter)	9.4	6.6
Mesosoma:	total length (tergites)	5.6	4.5
Sternite VII:	width	2.1	1.6
	length	1.1	1.0
Metasoma I:	maximum width	1.4	1.0
	maximum height	1.0	0.9
	length	1.1	0.9
Metasoma II:	maximum width	1.2	0.8
	maximum height	1.0	0.8
	length	1.4	1.0
Metasoma III:	maximum width	1.2	0.8
	maximum height	1.1	0.9
	length	1.5	1.1
Metasoma IV:	maximum width	1.1	0.9
	maximum height	1.1	0.9
	length	1.8	1.4
Metasoma V:	maximum width	1.1	0.8
	maximum height	1.1	0.8
	length	2.8	2.2
Telson:	maximum width	0.9	0.7
	maximum height	0.8	0.7
	aculeus length	0.7	0.5
	total length	2.1	2.0
Metasoma:	total length ²	10.7	8.6
Total length:	carapace+mesosoma+metasoma	18.5	14.2
Pectines:	total length	1.2	1.0
	length along dentate margin	0.9	0.8
	tooth count (left/right)	8/8	8/8

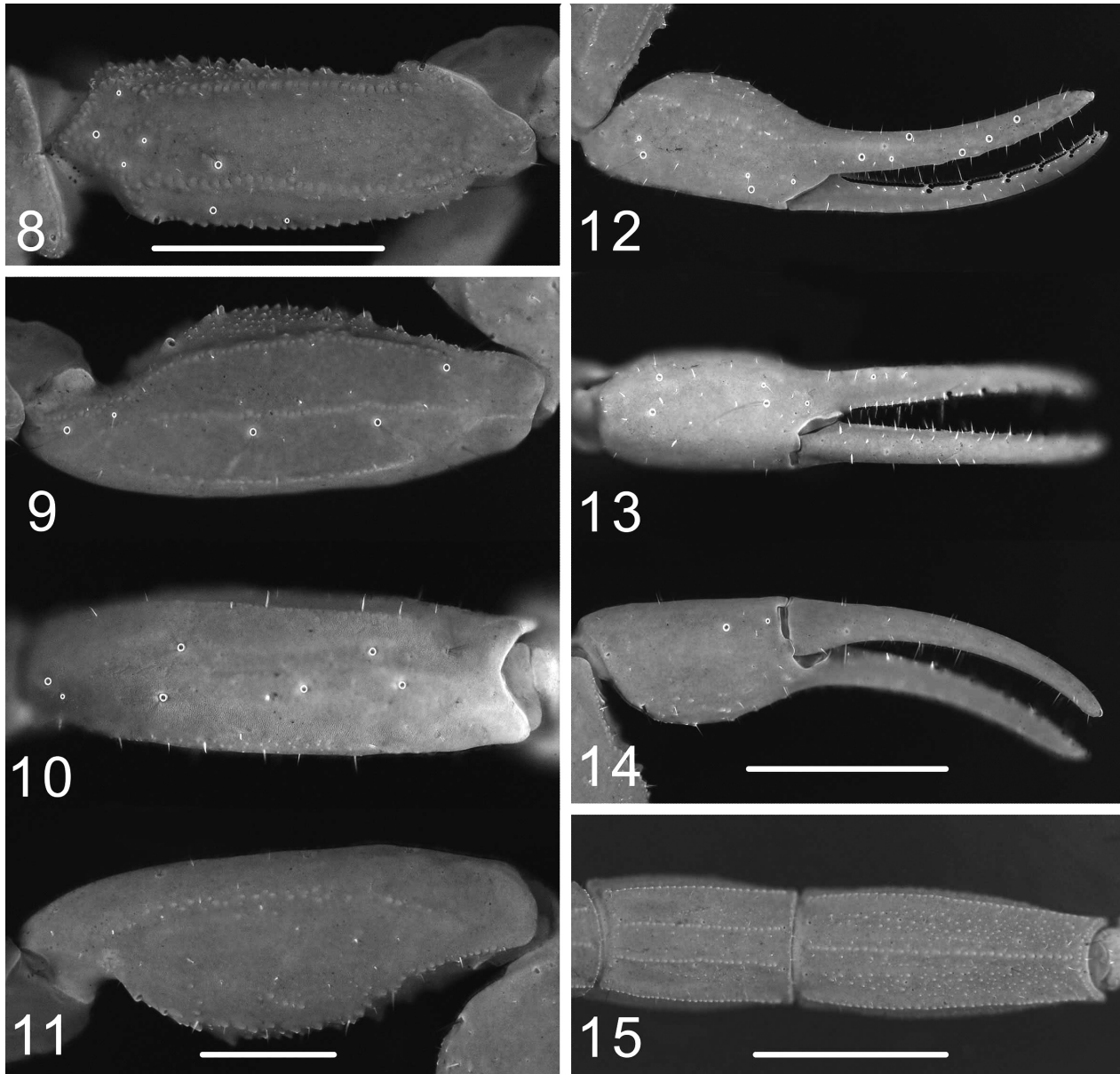
developed than other segments. Anal arch without lobes, narrower than distal margin (Fig. 15). Telson smooth with well developed spinoid subaculear tubercle (Fig. 16). Vesicle width uniform throughout length (Fig. 17). Aculeus short, moderately curved. Four large macrosetae present on subaculear tubercle and two at base of aculeus; several small microsetae sparsely distributed on vesicle (Figs 16, 17).

DISTRIBUTION

Known only from the type locality in the Département du Atakora, Benin. It is at present impossible to know whether *A. atakora* sp. n. is restricted to the Chaîne de l'Atakora, but considering that the north-western border of the mountain range is rich in streams and densely vegetated cliffs, the species may



Figures 4-7. *Akentrobuthus atakora* sp. n., holotype ♀ (AMNH). 4. Habitus, dorsal aspect. 5. Habitus, ventral aspect (scale = 3.4 mm). 6. Carapace (scale = 0.85 mm). 7. Sternum and pectines (scale = 0.9 mm).

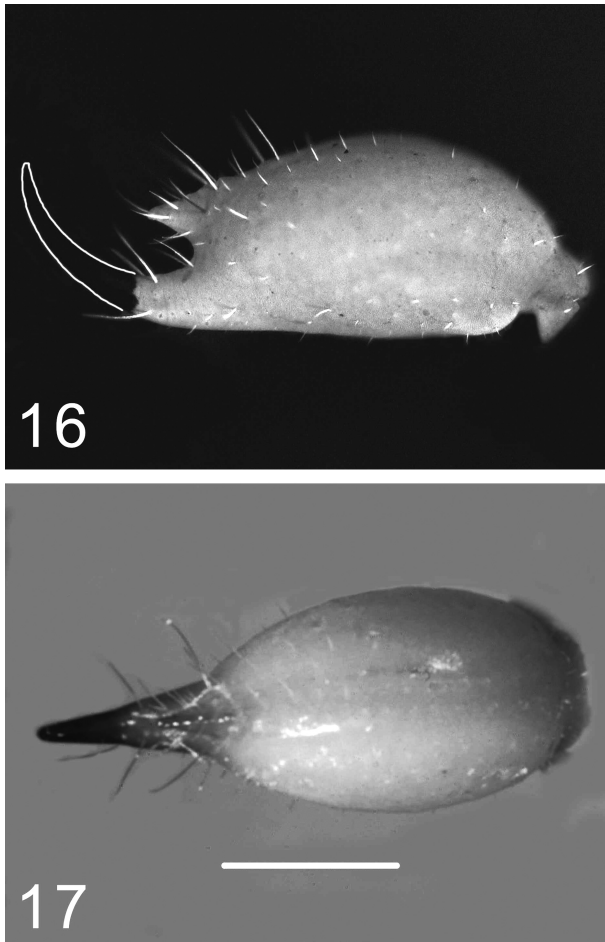


Figures 8-15. *Akentrobuthus atakora* sp. n., holotype ♀ (AMNH). 8-13 Distribution of trichobothria on dextral pedipalp. 8. Femur, dorsal aspect (scale = 1.5 mm). 9. Patella, dorsal aspect. 10. Patella, external aspect. 11. Patella, ventral aspect (scale = 0.6 mm). 12. Chela, dorsal aspect. 13. Chela, external aspect. 14. Chela, ventral aspect (scale = 0.8 mm). 15. Carination of metasomal segments IV and V (scale = 1.8 mm).

be more broadly distributed. Its presence in the surrounding lowlands is improbable, however, because the area's topography is generally flat and, where uncultivated, covered by semi-arid savannah (Delvingt *et al.* 1989). Considering the apparently humid requirements of the genus *Akentrobuthus* (*A. leleupi* inhabits primary rainforests) and the general aridity of the Dahomey Gap, which is covered mostly by semi-arid savannah and semi-deciduous forests (Natta *et al.* 2002; Prendini 2004), we presume that the new species is restricted to relict forests with high humidity and is therefore very localised in occurrence.

ECOLOGY

Akentrobuthus atakora sp. n. was collected in a riparian forest surrounding a waterfall (Fig. 1). The specimen was detected at night with the aid of UV light walking on leaf litter under dense vegetation. *Akentrobuthus leleupi* was the first buthid scorpion characterised as a strict inhabitant of the leaf litter (Lamoral 1976; Lourenço 2003), and both species of the genus may be considered hypogean-humicolous scorpions (Polis 1990). Neither species of *Akentrobuthus* displays obvious ecomorphological adaptations that



Figures 16-17. *Akentrobuthus atakora* sp. n., holotype ♀ (AMNH), telson. 16. Lateral aspect. 17. Ventral aspect (scale = 0.8 mm).

could have been selected for by the substratum, as characteristic of other ecomorphotypes (Prendini 2001, 2005). However, the rather small size and the reduction in number of lateral ocelli may represent adaptations to the leaf-litter habitat.

The holotype was collected in sympatry with three buthid scorpions, *Babycurus kirki*, *Butheoloides* sp. and *Hottentotta hottentotta*, as well as a scorpionid, *Pandinus imperator*. This locality contained the highest scorpion diversity (five species in five genera and two families) among several localities at which the scorpion fauna was surveyed during fieldwork in Benin (Vignoli *et al.* 2006). Although the scorpion diversity at this locality is relatively low compared, for example, to scorpion communities in southern Africa (Prendini 2005), the Chaîne de l'Atakora apparently represents a hot spot of scorpion diversity in tropical West Africa. All other West African localities that have been reported in the literature contain fewer scorpion species (Prendini 2004). We attribute this richness to the region's rugged topography and pristine conditions.

ADDITIONAL MATERIAL EXAMINED

Akentrobuthus leleupi Lamoral, 1976: DEMOCRATIC REPUBLIC OF THE CONGO: Holotype: 1 ♀ (MRAC 75735), Kivu: Kalche, Bunyakiri, 02°04'34"S, 28°34'25"E, 1050 m, IX.1953, N. Leleup. Paratypes: 7 ♀ (MRAC 75599, 75730-33, 75664-65), same data as holotype; 1 ♀ (MRAC 111210), Kivu: Territoire de Mwenga, Poste Kitutu, Bac de l'Elila, right edge, 03°02'27"S, 28°25'49"E, 650 m, IV.1958, N. Leleup; 1 ♀ (MRAC 81365), Territoire Masisi, Mutakato, 01°25'58"S, 28°57'19"E, 800 m, IX.1953, N. Leleup.

DISCUSSION

The genus *Akentrobuthus* has not been collected in 32 years, since the description of the type species *A. leleupi*. During our field survey of Benin, only a single specimen was collected, despite extensive searching. We presume that the scarcity of *Akentrobuthus* species may be explained, in part, by their specialised ecology. Preference for a specific microhabitat (leaf litter) may restrict these scorpions to suitable environments (primary rainforests) resulting in a localised, patchy pattern of distribution. Such scorpions are not only geographically localised, but difficult to collect without appropriate techniques, compared to larger opportunistic and synanthropic scorpions (*e.g.* *Hottentotta*), which are often well known to local people and easily collected by non-specialists. The use of ultraviolet detection methods at night and leaf-litter sifting with specific size sifts by day greatly increases the chances of collecting cryptic scorpions like *Akentrobuthus*. The discovery of this new species demonstrates how poorly known the scorpion fauna of tropical Africa remains. It seems likely that *Akentrobuthus* is more broadly distributed in the rainforests of West and Central Africa, and that more species will be discovered if these regions are surveyed with appropriate methods.

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REFERENCES

- DELVINGT, W., HEYMANS, J.C. & SINSIN, B. 1989. *Guide du Parc national de la Pendjari*. Brussels: CECA-CEE-CEA.
- FET, V. 2000. Family Microcharmidae Lourenço, 1996. In: Fet, V., Sissom, W.D., Lowe, G. & Braunwalder, M.E. (eds), *Catalog of the Scorpions of the World (1758-1998)*. New York, New York Entomological Society, 421-423.
- FET, V. & LOWE, G. 2000. Family Buthidae C. L. Koch, 1837. In Fet, V., Sissom, W.D., Lowe, G. & Braunwalder, M.E. (eds), *Catalog of the Scorpions of the World (1758-1998)*. New York, New York Entomological Society, 54-286.
- HJELLE, J.T., 1990. Anatomy and Morphology. In: Polis, G.A. (ed.), *The Biology of Scorpions*. Stanford: Stanford University Press, 9-63.
- GILLES, A.S., NAGO, A., GRELL, O., SINSIN, B. & RÖDEL, M.O. 2006. The amphibian fauna of Pendjari National Park and surroundings, northern Benin. *Salamandra* 42: 93-108.
- LAMORAL, B.H. 1976. *Akentrobuthus leleupi*, a new genus and species of humicolous scorpion from eastern Zaïre, representing a new subfamily of the Buthidae. *Annals of the Natal Museum* 22(3): 681-691.
- LOURENÇO, W.R. 1998. Une nouvelle famille est nécessaire pour des microscorpions humicoles de Madagascar et d'Afrique. *Comptes rendus de l'Académie des Sciences. Paris, Sciences de la vie* 321: 845-848.
- LOURENÇO, W.R. 2000. Un nouveau genre de scorpion malgache, maillon possible entre les Microcharmidae et les Buthidae. *Comptes rendus de l'Académie des Sciences. Paris, Sciences de la vie* 323: 877-881.
- LOURENÇO, W.R. 2003. Humicolous buthoid scorpions: a new genus and species from French Guiana. *Comptes rendus Biologies* 326: 1149-1155.
- NATTA, A.K., SINSIN, B. & VAN DER MAESEN, L.J.G. 2002. Riparian forests, a unique but endangered ecosystem in Benin. *Notulae Florae Beninensis* 4. *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 124: 55-69.
- POLIS, G.A. 1990. Ecology. In: Polis, G.A. (ed.), *The Biology of Scorpions*. Stanford: Stanford University Press, 247-293.
- PRENDINI, L. 2000. A new species of *Parabuthus* Pocock (Scorpiones: Buthidae), and new records of *Parabuthus capensis* (Ehrenberg), from Namibia and South Africa. *Cimbebasia* 16: 31-45.
- PRENDINI, L. 2001. Substratum specialization and speciation in southern African scorpions. In: Fet V. & Selden P.A. (eds), *Scorpions 2001*. In Memoriam Gary A. Polis. Burnham Beeches, UK: British Arachnological Society, 113-138.
- PRENDINI, L. 2004. On the Scorpions of Gabon and neighbouring countries, with a reassessment of the synonyms attributed to *Babycurus buettneri* Karsch and a redescription of *Babycurus melanicus* Kovařík. In: Fisher B.L. (ed.), *Monts Doudou, Gabon. A Floral and Faunal Inventory with Reference to Elevation Variation*. California Academy of Sciences Memoir 28: 235-267.
- PRENDINI, L. 2005. Scorpion diversity and distribution in southern Africa: pattern and process. In: Huber, B.A., Sinclair, B.J. & Lampe, K.-H. (eds), *African Biodiversity: Molecules, Organisms, Ecosystems*. Proceedings of the 5th International Symposium on Tropical Biology, Museum Alexander Koenig, Bonn. New York: Springer Verlag, 25-68.
- SISSOM, W.D., 1990. Systematics, biogeography and paleontology. In: Polis, G.A. (ed.), *The Biology of Scorpions*. Stanford: Stanford University Press, 64-160.
- SMITHE, F.B. 1974. *Naturalist's color guide*. Supplement. New York: American Museum of Natural History.
- SMITHE, F.B. 1975. *Naturalist's color guide*. New York: American Museum of Natural History.
- SMITHE, F.B. 1981. *Naturalist's color guide*. Part III. New York: American Museum of Natural History.
- SOLEGLAD, M.E. & FET, V. 2003. The scorpion sternum: Structure and Phylogeny (Scorpiones, Orthosterni). *Euscorpius* 5: 1-34.
- STAHNKE, H.L. 1970. Scorpion nomenclature and mensuration. *Entomological News* 81: 297-316.
- VACHON, M. 1974. Étude des caractères utilisés pour classer les familles et les genres de Scorpions (Arachnides). 1. La trichobothriotaxie en arachnologie. Sigles trichobothriaux et types de trichobothriotaxie chez les Scorpions. *Bulletin du Muséum national d'Histoire naturelle, Paris*, 3e sér., n° 140, Zool. 104: 857-958.
- VIGNOLI, V., TCHIBOZO, S. & PRENDINI, L. 2006. First survey of scorpion diversity in the Republic of Benin (Western Africa). In: *Abstracts of 23rd European Colloquium of Arachnology, 4-8 September, Sitges, Barcelona (Spain)* 129.