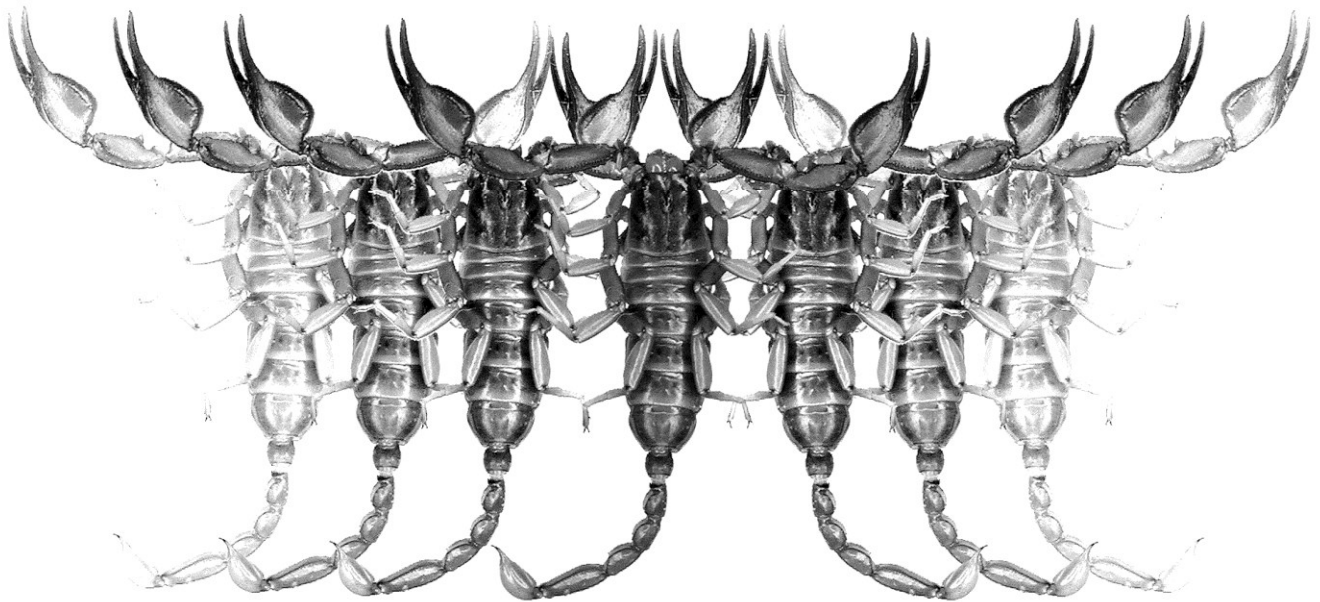


Euscorpius

Occasional Publications in Scorpiology



**A New Species of *Androctonus* Ehrenberg, 1828
from Northwestern Egypt (Scorpiones: Buthidae)**

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A new species of *Androctonus* Ehrenberg, 1828 from northwestern Egypt (Scorpiones: Buthidae)

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Summary

Androctonus tenuissimus sp. n. from two coastal localities placed in northwestern Egypt is herein described, an addition that represents the fifth species of this genus confirmed to occur in this North African country. It is most closely related only to *Androctonus bicolor* Ehrenberg, 1828, which is widely distributed across northeast Africa and the Middle East and also occurs in Egypt. Both are the only species in the genus whose adults of both sexes show the following combination of three diagnostic characters: coloration uniformly blackish, pedipalp chelae conspicuously narrower than patella in adults, and pedipalp fingers with basal lobe/notch combination entirely absent. However, these two taxa can readily be distinguished by very marked differences in appendage attenuation, body sculpture and counts of principal rows of denticles on pedipalp fingers, among other characters.

Introduction

The genus *Androctonus* Ehrenberg, 1828, is a typical Saharo-Sindian taxon which occurs continuously from the Atlantic coast of North Africa through western India; it includes several of the largest known buthid scorpions and some of them have venom extremely toxic to humans (Fet & Lowe, 2000). It was partially revised by Vachon (1952), but since then it has been catalogued first by Fet & Lowe (2000) and last by Turiel (2013). Between these two compilations, many species were described as new, resurrected from synonymy, or raised from subspecies to species level (Lourenço, 2005, 2008; Lourenço & Qi, 2006, 2007; Lourenço et al., 2009, 2012; Kovařík & Ahmed, 2013).

The most recent of the two catalogues (Turiel, 2013), listed 21 species as valid and four of them were recorded to occur in Egypt: *Androctonus amoreuxi* (Audouin, 1826), *A. australis* (Linnaeus, 1758), *A. bicolor* Ehrenberg, 1828, and *A. crassicauda* (Olivier, 1807). Very recently, an undescribed species most closely related to *A. bicolor* was collected in two coastal localities of northwest Egypt. The description of this new species is the main objective of the present paper.

Methods & Material

The specimens were studied, measured and photographed under a Zeiss Stemi 2000-C stereomicroscope, equipped with line scale and grid ocular micrometers. The high-resolution digital images obtained were then slightly processed with Adobe Photoshop®CS, only to remove background and to optimize brightness and contrast for print.

Nomenclature and measurements follow Stahnke (1970), Kovařík (2009), and Kovařík & Ojanguren Affilastro (2013), except for trichobotriotaxy (Vachon, 1974), metasomal carinae (Francke, 1977), pedipalp chela carinae (Acosta et al., 2008, as interpreted by Armas et al., 2011), and sternum (Soleglad & Fet, 2003). Unless otherwise noted, all morphologically diagnostic characters mentioned in the text refer to adults of both sexes.

Specimens studied herein are preserved in 80% ethanol and deposited in the personal collections of the authors abbreviated as: RTOC, the first author's collection (followed by catalogue number, with collecting and identification labels originally written in Spanish), and FKCP, the second author's collection.

Systematics

Androctonus tenuissimus Teruel, Kovařík et
Turiel, **sp. n.**

(Figs. 1–7, Tables 1–3)

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TYPE LOCALITY AND TYPE DEPOSITORY. Egypt, Matruh Province, Marsa Matruh [= Marsá Maṭrūh]; RTOC.

TYPE MATERIAL. **Egypt**, Matruh Province, Marsa Matruh [= Marsá Maṭrūh], 2011, leg. A. Tolba, 1♂ holotype (Figs. 1–2, RTOC: Sco.0552), 2♀♀ paratypes (RTOC: Sco-0553). Matruh Province, Ad Dabah [= Ad Dab'ah], 2011, leg. A. Tolba, 2♀♀ paratypes (RTOC: Sco-0554), 1♂, 2♀♀ paratypes (Figs. 3–16, FKCP).

ETYMOLOGY. The selected name is the superlative grade of a Latin adjective that means “slender”. It alludes to the extreme pedipalp attenuation of this species, which is by far unmatched amongst all described members of the genus.

DIAGNOSIS. Adult size moderately large (males 65–72 mm, females 63–87 mm) for the genus. Coloration basically very dark to blackish brown; pedipalps and legs apically yellowish, but with carinae infuscate and intercarinal dark reticulations; metasoma with all carinae infuscate. Pedipalps very long and slender, with hand conspicuously narrower than patella and strongly carinate; fixed and movable fingers with 13–14 and 14–15 principal rows of denticles, respectively, basal lobe/notch combination absent. Carapace densely granulose, with anterior and posterior median carinae strong. Sternite V with a large smooth patch in adult males, VI–VII with four carinae. Metasoma moderately robust and not especially deep (males with segments I and III wider than long, other segments longer than wide; females with all segments longer than wide; all segments wider than deep in both sexes), and with 10-10-8-8-5 complete to almost complete carinae, most of which are finely serrate to crenulate; segments II–IV dorsolateral carinae with 1–3 enlarged terminal denticles; segment V ventrolateral carinae with 6–8 acutely flared denticles and anal arch with 2–3 very poorly defined round lobes; all intercarinal spaces densely granulose. Telson very slender, with vesicle very small and flat, and aculeus about as long as vesicle. Leg bristlecombs well developed on I–III, poorly defined on IV. Pectines with 27–28 teeth (mode 27) in males, and 21–23 (mode 21) in females.

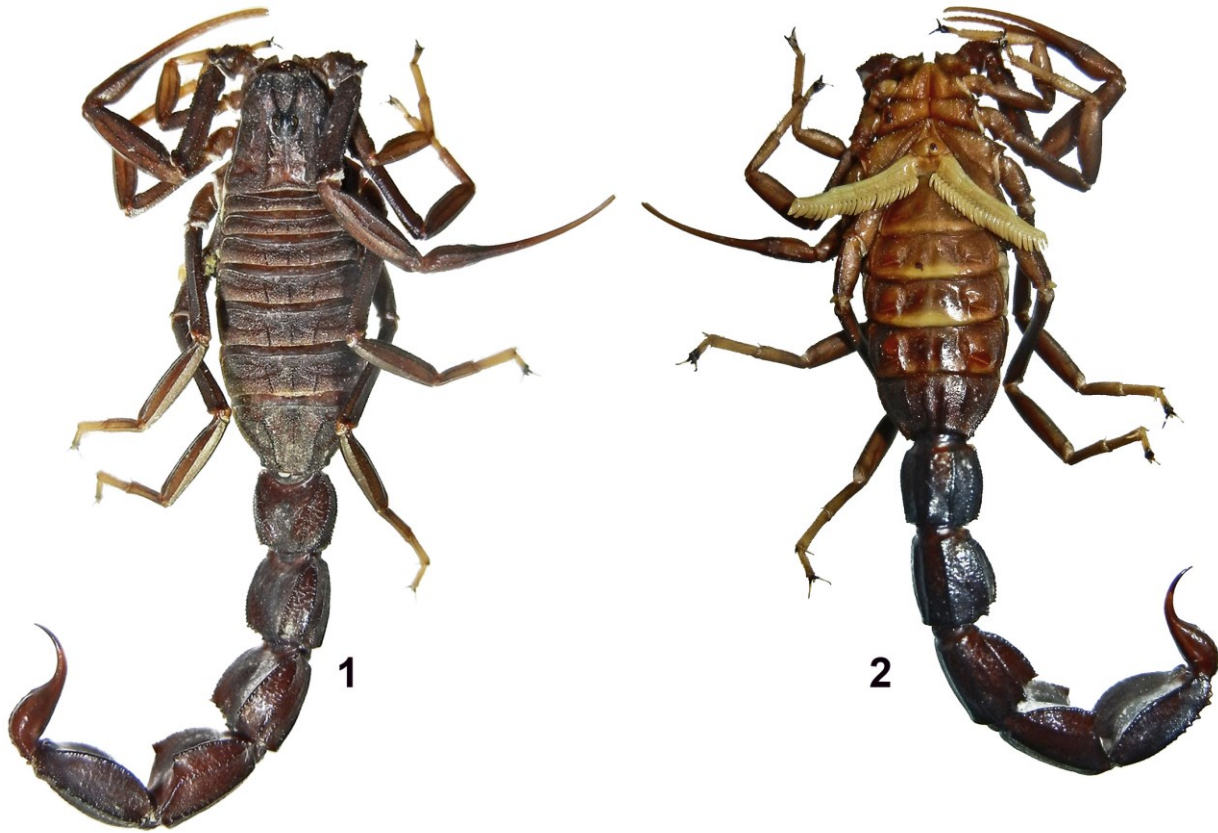
DESCRIPTION (adult male holotype, Figs. 1–2). Coloration essentially uniform dark brown to unaided eye, with a blackish shade in live individuals that becomes

reddish after preservation; ocular tubercles, eyes and distal part of aculeus blackish. Chelicerae deeply infuscate to very densely reticulate. Pedipalps and legs progressively lighter apically, becoming yellowish, but with all carinae infuscate and dark reticulations between carinae. Pectines yellowish. Sternite V with the smooth patch pale yellowish. Metasoma with all carinae plus the apical portion of all segments infuscate. Telson with vesicle and basal half of aculeus somewhat paler. Chelicerae with dentition typical for the genus; tegument polished and smooth except on dorsodistal portion of manus, which possesses coarse granules arranged in longitudinal ridges.

CARAPACE. Trapezoidal, wider than long and with all carinae strongly granulose, but not fused into any particular configuration; tegument very densely covered by uniformly small granules; anterior margin straight, with five pairs of stout macrosetae; median eyes separate by more than one ocular diameter; five pairs of lateral eyes: three large and aligned, plus two small and slightly offset.

MESOSOMA. Tergites very densely covered by uniformly small granules; I–VI with three carinae (median and submedians), which are strong and finely granulose and projected beyond posterior margin as conical granules; VII with five carinae (median, submedians and laterals) which are strong and finely granulose. Sternum standard for the genus: type 1, relatively small, and markedly triangular in shape. Pectines very long (extending well beyond coxa-trochanter joint of leg IV), narrow and densely setose; tooth count 27/27; basal plate heavily sclerotized and about as long as wide, anterior margin with strong median indentation, posterior margin convex. Sternites III–VI smooth, glossy and sparsely setose, spiracles very elongate and slit-like; III without granulose lateral areas; V with smooth patch very large, widely subtriangular and moderately bulky, conspicuously paler than the rest of the plate; VI sparsely granulose, with two pairs of costate to subcostate carinae: submedians weak and coarse, laterals well-developed and less coarser; VII densely granulose, with two pairs of strong and coarsely costate to subcrenulate carinae.

METASOMA AND TELSON. Metasoma very sparsely setose, with all segments moderately robust and not especially deep (I and III wider than long, II and IV–V longer than wide; all segments wider than deep); intercarinal tegument densely granulose and forming irregular reticulations on all surfaces, dorsally on I–IV forming triangular to arrowhead-shaped patches; dorsal furrow moderately shallow and narrow on all segments; I–II with ten complete to almost complete carinae (lateral inframedian carinae becomes less defined on the basal portion of II), III–IV with eight, and V with five, all strong and finely serrate to crenulate except for the lateral supramediains on V which are subgranulose, dor-



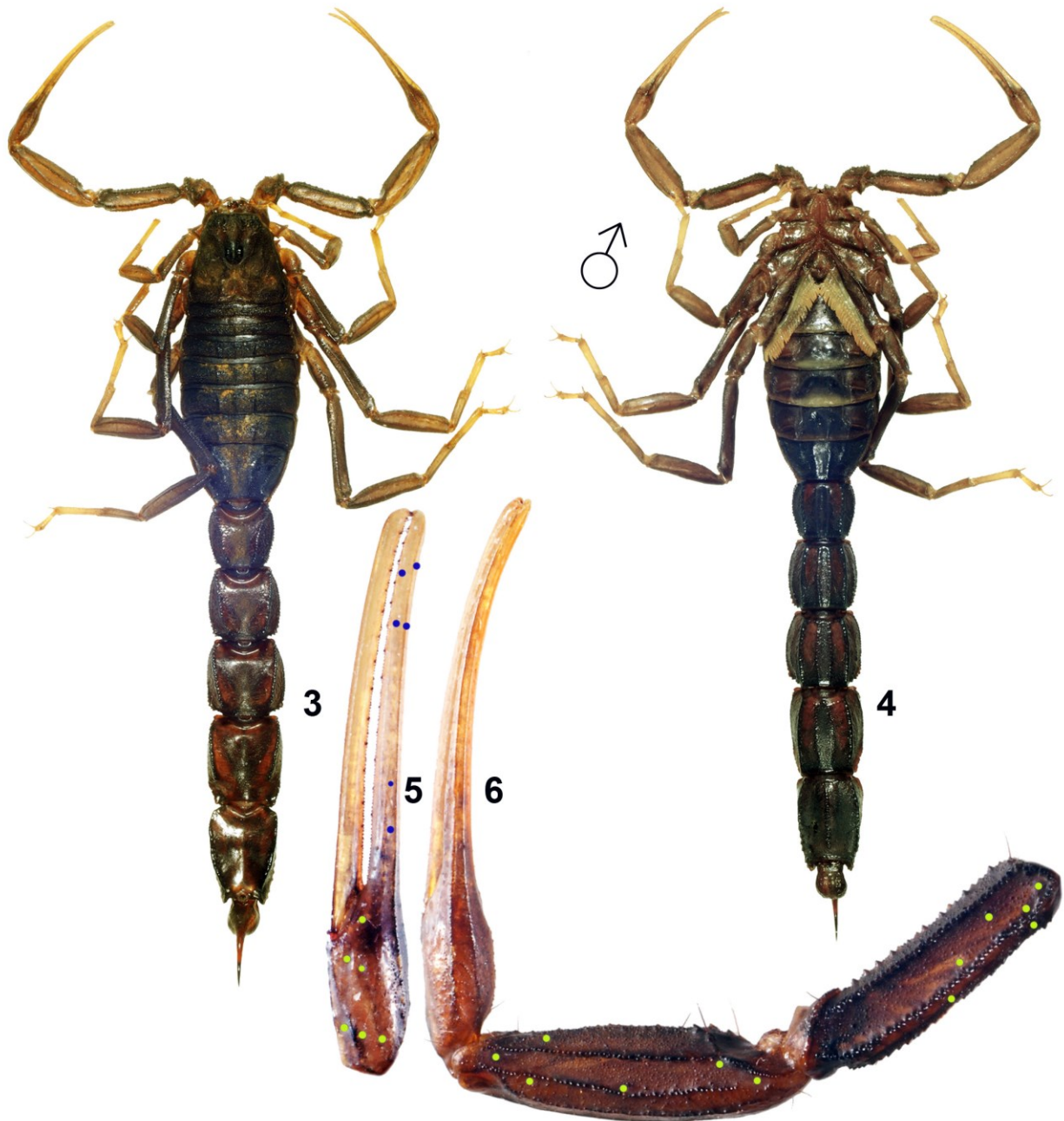
Figures 1–2: *Androctonus tenuissimus* sp. n., dorsal (1) and ventral (2) views, ♂ holotype (71.6 mm, RTOC).

solateral carinae on II–IV and ventrolateral carinae on V progressively raised: the former with 1–3 enlarged terminal denticles, and the latter with 6–8 acutely flared denticles, and anal arch with 2–3 very poorly defined round lobes. Telson very slender and sparsely setose; vesicle very small and flat (1.58 times longer than wide, 1.24 times wider than deep), tegument glossy and essentially smooth, only with some vestiges of coarse granules and punctures, and a poorly defined ventro-medial carinae; subaculear tubercle insinuated by a coarse granule flanked by the subaculear setal pair; aculeus very long and sharp, about as long as vesicle, and evenly curved.

LEGS. Legs very long, slender and only sparsely setose; bristlecombs well-developed on I–III, poorly defined on IV; all carinae granulose to subserrate; intercarinal tegument finely granulose to coriaceous; tibial spurs absent from I–II, well developed on III–IV; prolateral pedal spur long and slender in all legs, basally bifurcate and with 3–4 macrosetae on all legs, retrolateral pedal spur very long and slender on all legs, not bifurcate and essentially bare; ventral surface of all tarsomere II sharply edged and with two ventrosubmedian rows of about eight spiniform setae, without median row of spinules; claws very long, slender and evenly curved.

PEDIPALPS. Pedipalps very long and slender, only very sparsely setose and orthobothriotaxic A-β. Femur long, slender and straight; all carinae strong and finely granulose; intercarinal tegument densely granulose. Patella very long, slender and slightly curved inwards; all carinae moderately strong and finely granulose; intercarinal tegument densely granulose. Chela with hand conspicuously narrower than patella, oval slender (2.0 times longer than wide) and with all carinae moderately strong and finely granulose to subgranulose, intercarinal tegument coriaceous with many sparse granules on all surfaces, denser and forming irregular reticulations dorsally and internally; fingers extremely long and slender (movable finger 3.1 times longer than underhand), almost straight and without basal lobe/notch combination, fixed fingers with 14 principal rows of granules; movable fingers with 15 principal rows of granules and three terminal granules (large terminal denticle not included).

FEMALE (Figs. 7–10, 13–16). In general is similar to the male, but there is a clear sexual dimorphism evidenced by: (1) mesosoma relatively wider; (2) metasoma more slender; (3) pedipalps remarkably longer and narrower, especially chelae; (4) genital papillae absent; (5) pecti-



Figures 3–6: *Androctonus tenuissimus* sp. n., dorsal (3) and ventral (4) views, and left pedipalp with trichobothrial pattern indicated (5. Pedipalp chela external. 6. Pedipalp chela, femur and patela dorsal), ♂ paratype (63.7 mm, FKCP).

nes somewhat smaller and with non-overlapping, lower tooth counts; (6) sternite V with smooth patch poorly defined and not bulky.

VARIATION. The size differences among adults seem to indicate the existence of two size-classes in males and three in females; inside the same class, males are consistently smaller than females (Tab. 1). The paratype male is somewhat smaller than the holotype, but both specimens are almost identical in most diagnostically

relevant morphometric ratios (Tabs. 1 and 3); females are more variable, but show the expected direct correlation between size and expression of sexual secondary dimorphism: larger specimens invariably possess the most attenuate pedipalps and a more robust metasoma (Tabs. 2–3).

Count of teeth per pecten varied in males from 27 (3) to 28 (1), and in females as follows: 21 (7), 22 (4), and 23 (1). The number of principal rows of denticles varied from 13–14 and 14–15 in fixed and movable fingers,

Dimensions		♂ Paratype (FKCP)	♂ Holotype (RTOC)
Carapace	L / Wp	6.6 / 7.3	6.8 / 7.5
Mesosoma	L	21.2	25.3
Tergite VII	L / W	4.2 / 7.3	4.8 / 7.7
Metasoma	L	37.5	39.5
Segment I	L / W / H	4.8 / 5.0 / 3.8	4.9 / 5.2 / 4.0
Segment II	L / W / H	5.5 / 5.4 / 3.7	5.7 / 5.6 / 4.0
Segment III	L / W / H	5.7 / 5.9 / 4.2	6.1 / 6.2 / 4.3
Segment IV	L / W / H	6.8 / 5.7 / 4.1	7.1 / 6.0 / 4.3
Segment V	L / W / H	7.4 / 5.2 / 3.4	7.7 / 5.5 / 3.5
Telson	L	7.3	8.0
Vesicle	L / W / H	3.8 / 2.5 / 2.0	4.1 / 2.6 / 2.1
Aculeus	L	3.5	3.9
Pedipalp	L	26.1	26.5
Femur	L / W	6.7 / 1.5	6.6 / 1.7
Patella	L / W	7.6 / 2.1	7.6 / 2.1
Chela	L	11.8	12.3
Hand	L / W / H	2.9 / 1.5 / 1.6	3.0 / 1.5 / 1.6
Movable finger	L	8.9	9.3
Total	L	65.3	71.6

Table 1: Measurements (mm) of the two adult male types of *Androctonus tenuissimus* **sp. n.** Abbreviations: length (L), width (W), posterior width (Wp), depth (H), left (L), right (R).

respectively; in all cases variation corresponded to poorly defined basalmost rows.

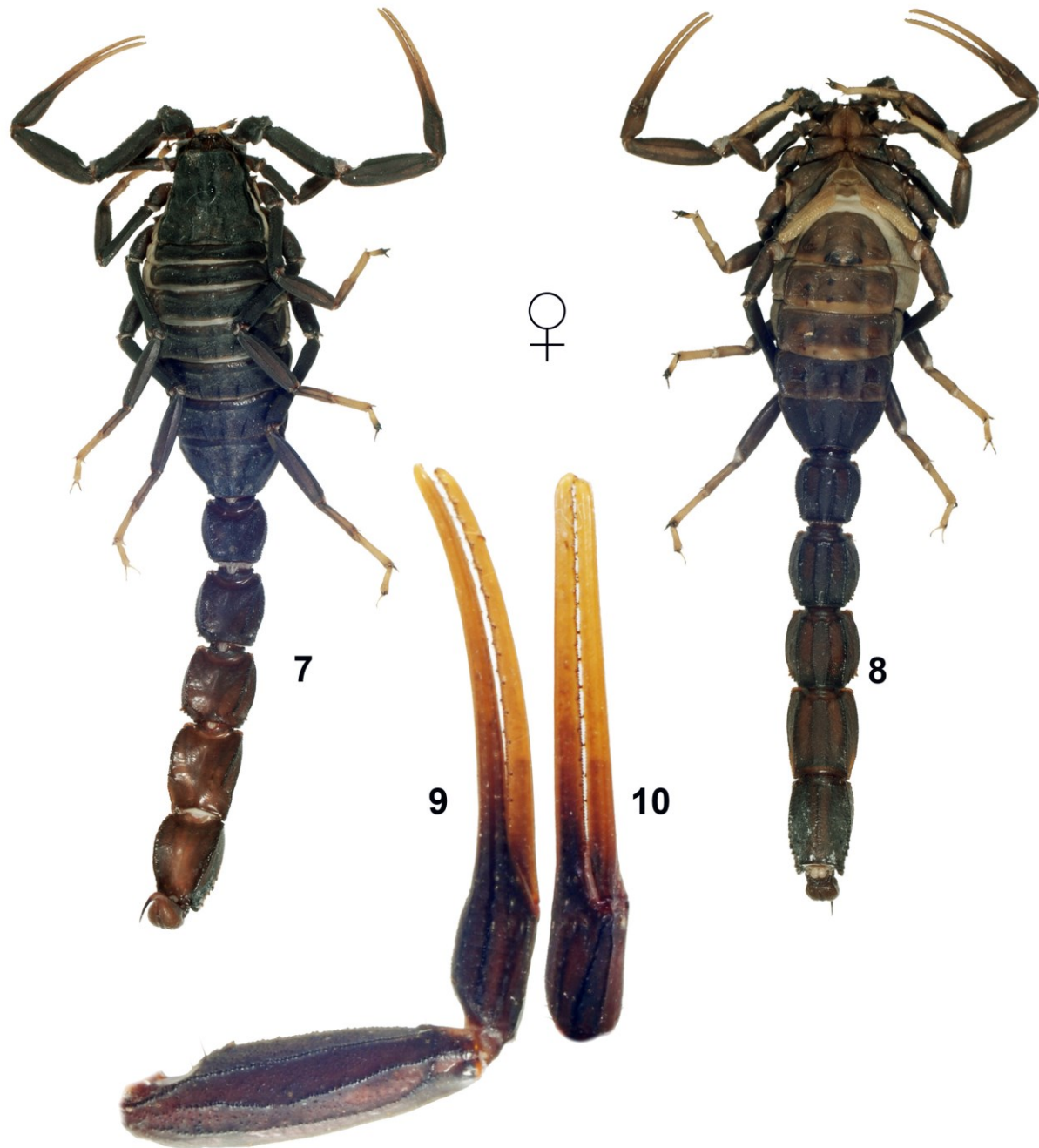
AFFINITIES. Amongst the 21 species currently recognized as valid in this genus (Turiel, 2013), only *A. bicolor* and *A. sergenti* Vachon, 1948, do share with *A. tenuissimus* **sp. n.** the following combination of three characters in adults of both sexes: 1) coloration uniformly blackish; 2) pedipalps very slender, with chelae much narrower than patella; 3) pedipalp fingers without basal lobe/notch combination. All other species of *Androctonus* which are uniformly blackish also possess adult pedipalp chelae wider than patella, and with basal lobe/notch combination of fingers present at least in males.

Of these two species that could be confused with *A. tenuissimus* **sp. n.** the easiest to separate is *A. sergenti*: on the basis of the very detailed and widely illustrated redescription made by Vachon (1952), this taxon differs remarkably from the former by having a coarsely punctate metasoma, conspicuously less attenuate pedipalps, and much more reduced granulation and carination on the body and appendages, especially the dorsal surface of metasoma which is essentially smooth. Furthermore, *A. sergenti* is locally endemic from a small area of the high Anti-Atlas Mountains of south-central Morocco (Vachon, 1952).

The closest relative to *A. tenuissimus* **sp. n.** is actually *A. bicolor*, but it can be readily distinguished from the former on the basis of the following unambiguous char-

acters: 1) pedipalps much less attenuate (femur, patella, and chela remarkably shorter), with carinae much weaker and intercarinal tegument much less granulose (Figs. 5–6, 9–10, 17–18 and 20–21; Tab. 3); 2) pedipalp fixed and movable fingers with 12–13 and 13–14 principal rows of denticles, respectively; 3) metasoma much wider and deeper (segments I–IV always wider than long), with carinae much coarser and intercarinal tegument essentially smooth and glossy (Figs. 11–16, 19, and 22; Tab. 3); 4) ventrolateral carinae on metasomal segment V with the flared denticles rounded and much more irregular, not progressively larger (Figs. 11–16 and 17–22); 5) carapace and tergites with all carinae coarser and intercarinal granulation coarser and more irregular. Further, adults of these two species widely overlap in size, color and pectinal tooth counts, but there is a slight but consistent tendency in *A. bicolor* to be somewhat smaller, darker (usually pitch-black), and to possess lower counts.

COMMENTS. The only information available on the ecology of *A. tenuissimus* **sp. n.** is that it occurs together with *A. bicolor*, something that was already partially addressed by Levy & Amitai (1980) by recording the second species from Marsa Matruh as *A. bicolor bicolor*. Interestingly, Levy & Amitai (1980: 23) themselves declared to have studied specimens from Libya which were referable to “one or two other subspecies” different from the three they recognized in *A. bicolor*, but they did not describe or apply any formal names to them. It is



Figures 7–10: *Androctonus tenuissimus* sp. n., dorsal (7) and ventral (8) views, and right pedipalp femur and chela dorsal (9) and chela external (10), ♀ paratype (77 mm, FKCP).

very likely that at least one of those “other subspecies” does actually correspond to *A. tenuissimus* sp. n.

As we must demonstrate beyond any doubts that the taxon we are describing here has not already been officially named, we discuss below all those taxa that have been regarded at least once as subspecies of *A. bicolor*, because this is the only potential match based upon close morphological resemblance.

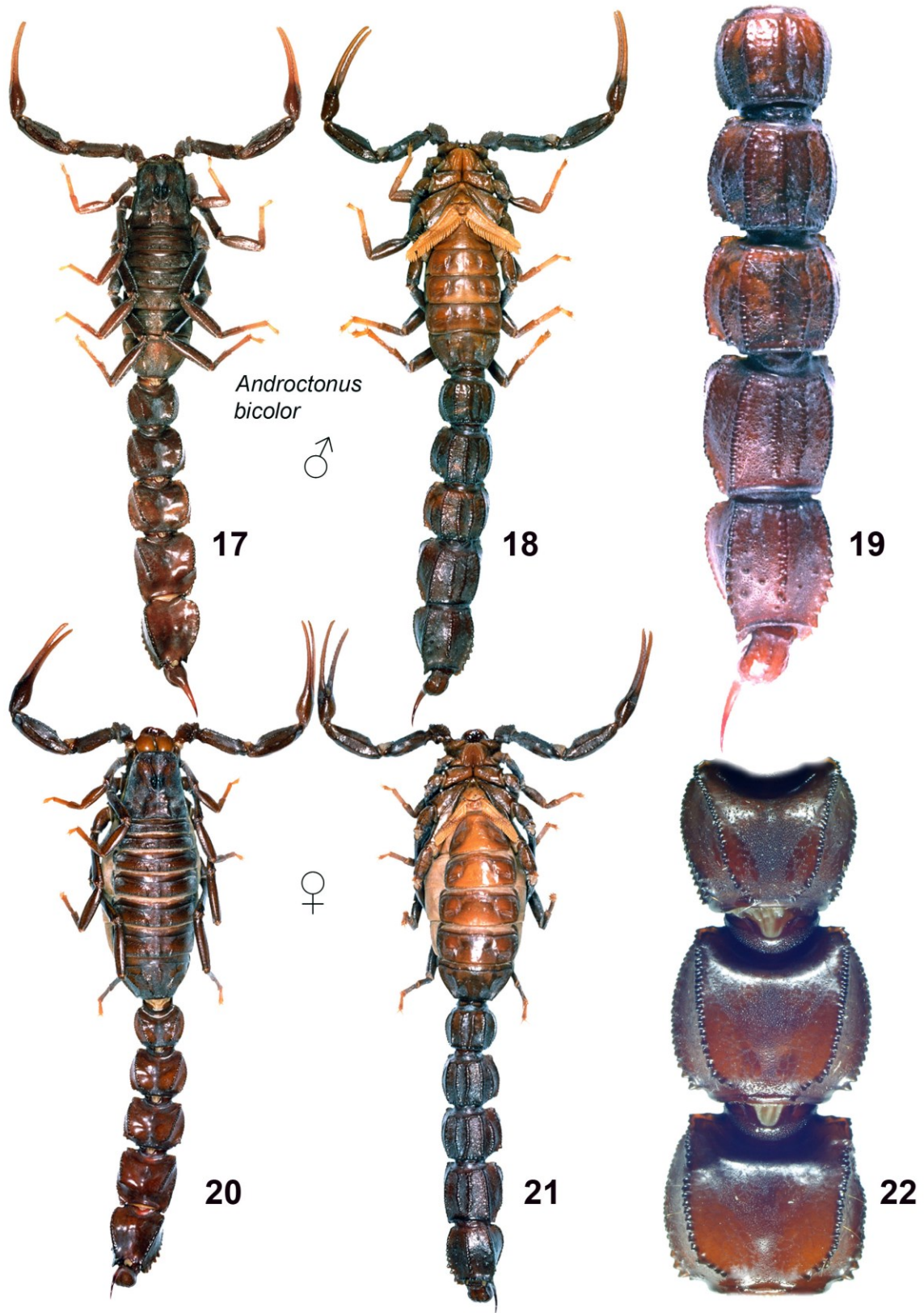
Androctonus bicolor aeneas C. L. Koch, 1839. It was described as a separate species, with just North Africa as the imprecise type-locality. Its taxonomic status remained controversial, mostly because the types have been long considered lost (see an essentially complete history in Fet & Lowe, 2000); its most recent nomenclatural position was defined by Lourenço (2005), who regarded it as a junior synonym of a “polymorphic”



Figures 11–16: *Androctonus tenuissimus* sp. n., metasoma and telson. 11–13. Ventral (11), dorsal (12), and lateral (13) views, ♂ paratype (63.7 mm, FKCP). 14–16. Ventral (14), dorsal (15), and lateral (16) views, ♀ paratype (77 mm, FKCP).

A. bicolor. It should be best considered a *nomen dubium* because no types exist and a precise type-locality has not been fixed, either originally or in a posterior revision. However, we prefer to give credit to the taxonomic interpretation of Vachon (1952), who regarded it as a valid species and presented a detailed and widely illus-

trated redescription based upon specimens from northern Algeria and Tunisia, which match perfectly the samples we have examined from the same area. Even if *A. aeneas* is restored as valid (a step which is beyond the scope of the present paper), it can be clearly distinguished from *A. tenuissimus* sp. n. by almost the same



Figures 17–22: *Androctonus bicolor* Ehrenberg, 1828, Libya, Cyrenaica (FKCP). 17–19. Dorsal (17) and ventral (18) views, and metasoma and telson ventral (19), ♂ (66 mm). 20–22. Dorsal (20) and ventral (21) views, and first to third metasomal segments dorsal (22), ♀ (85 mm).

Dimensions		♀ Paratype (Ad Dabah)	♀ Paratype (Ad Dabah)	♀ Paratype (Marsa Matruh)	♀ Paratype (Marsa Matruh)
Carapace	L / Wp	7.1 / 7.3	8.1 / 8.7	8.5 / 9.2	8.6 / 9.8
Mesosoma	L	17.8	22.4	23.2	30.0
Tergite VII	L / W	4.1 / 7.3	5.7 / 10.1	5.6 / 9.3	5.5 / 9.2
Metasoma	L	37.8	45.6	45.7	47.9
Segment I	L / W / H	4.9 / 4.8 / 3.8	6.1 / 6.0 / 4.6	6.0 / 5.9 / 4.8	6.1 / 6.0 / 4.7
Segment II	L / W / H	5.3 / 5.1 / 3.8	6.5 / 6.4 / 5.0	6.7 / 6.3 / 4.7	7.1 / 6.6 / 4.7
Segment III	L / W / H	5.8 / 5.4 / 3.9	6.9 / 6.8 / 5.0	7.0 / 6.7 / 4.8	7.2 / 7.0 / 4.9
Segment IV	L / W / H	6.8 / 5.2 / 3.8	8.2 / 7.0 / 4.8	8.3 / 6.6 / 5.0	8.5 / 7.0 / 5.1
Segment V	L / W / H	7.5 / 4.6 / 2.9	8.9 / 6.1 / 4.0	8.9 / 5.8 / 4.2	9.4 / 6.8 / 4.3
Telson	L	7.5	9.0	8.8	9.6
Vesicle	L / W / H	3.6 / 2.6 / 2.1	4.4 / 3.0 / 2.4	4.0 / 2.9 / 2.3	4.8 / 3.1 / 2.5
Aculeus	L	3.9	4.6	4.8	4.8
Pedipalp	L	27.8	31.1	32.4	34.7
Femur	L / W	7.0 / 1.7	7.7 / 1.9	8.2 / 1.9	8.8 / 2.0
Patela	L / W	8.0 / 2.1	8.9 / 2.4	9.5 / 2.5	10.1 / 2.5
Chela	L	12.8	14.5	14.7	15.8
Hand	L / W / H	3.0 / 1.6 / 1.7	3.5 / 1.8 / 1.9	3.5 / 1.9 / 2.0	3.7 / 1.9 / 2.0
Movable finger	L	9.8	11.0	11.2	12.1
Total	L	62.7	76.1	77.4	86.5

Table 2: Measurements (mm) of four adult female types of *Androctonus tenuissimus* sp. n., from RTOC. Abbreviations: length (L), width (W), posterior width (Wp), depth (H), left (L), right (R).

Ratios	Males		Females	
	<i>A. tenuissimus</i> sp. n. (n = 2)	<i>A. bicolor</i> (n = 7)	<i>A. tenuissimus</i> sp. n. (n = 6)	<i>A. bicolor</i> (n = 9)
Metasomal segment I (L/W)	0.94–0.96	0.80–0.82	1.02	0.80
Metasomal segment II (L/W)	1.02	0.77–0.81	1.02–1.08	0.76–0.87
Metasomal segment III (L/W)	0.97–0.98	0.73–0.76	1.01–1.07	0.78–0.79
Metasomal segment IV (L/W)	1.18–1.19	0.92–0.96	1.17–1.31	0.96–0.97
Metasomal segment V (L/W)	1.40–1.42	1.10–1.16	1.38–1.63	1.07–1.23
Telson vesicle (L/W)	1.52–1.58	1.25–1.35	1.38–1.55	1.28–1.29
Telson vesicle (L/H)	1.90–1.95	1.59–1.67	1.71–1.92	1.52–1.71
Total (L) / Pedipalp (L)	2.50–2.70	2.41–2.47	2.26–2.49	2.35–2.61
Pedipalp femur (L/W)	3.88–4.47	3.11–3.44	4.05–4.40	3.20–3.27
Pedipalp patella (L/W)	3.62	2.85–3.04	3.71–4.04	2.84–3.08
Pedipalp chela (L/W)	7.87–8.20	6.10–6.16	7.74–8.32	6.45–5.76
Pedipalp chela (L)/movable finger (L)	1.32–1.33	1.37–1.38	1.31–1.32	1.36–1.38
Total (L)	65.3–71.6	60.7–67.8	62.7–86.5	64.2–80.9

Table 3: Comparison between *Androctonus tenuissimus* sp. n. and its closest relative *Androctonus bicolor*, based upon selected morphometric ratios of the adults. Abbreviations: length (L), width (W).

characters as *A. bicolor*, with the granulation of the dorsal surface of metasoma being the single exception.

Androctonus liouvillei (Pallary, 1924). It was described also as a separate species, from two localities in southwestern Morocco. Its taxonomic status also remained controversial (see an essentially complete history in Fet & Lowe, 2000), but it is currently regarded as

a valid species (Lourenço, 2005; Turiel, 2013). Vachon (1952) presented a detailed and widely illustrated redescription based upon specimens from southern Morocco (as *A. aeneas liouvillei*), which fits perfectly the specimens we have examined from this area. It is clearly distinct from *A. tenuissimus* sp. n. on the basis of its remarkably more robust pedipalps in adults of both



Figure 23: Same-sized live adult females of *Androctonus tenuissimus* sp. n. (right) and *Androctonus bicolor* (left), side by side to show the conspicuous morphological differences to unaided eye.

sexes, with chelae wider than patella and with basal lobe/notch combination moderately well-developed, as well as higher pectinal tooth counts.

Androctonus bicolor longecarinatus Caporiacco, 1932. It was described from three coastal localities of northeast Libya, north of the Cyrenaica Plateau. Kovařík & Whitman (2004) studied the types, found them all to be immatures, and regarded the taxon as a junior synonym of *A. bicolor* after designating a lectotype. It must have been best considered a *nomen dubium* on the basis of the immaturity of the types, as juveniles of closely related species of Buthidae cannot be reliably distinguished from each other. At any rate, the morphometric proportions of the metasomal segments calculated by us using the measurements originally given by Caporiacco (1932: 397), do not match *A. tenuissimus* sp. n. but *A. bicolor* instead.

COMPARATIVE MATERIAL EXAMINED (im. = immature).

Androctonus bicolor Ehrenberg, 1828: **Algeria**, without further data, ca. 1980, 1♂, 1im.♂ (FKCP). Ben-Saada, April 1988, leg. T. Peš, 1♀ (FKCP). **Libya**, Cyrenaica, leg. S. Colli, 1♂, 1♀ (Figs. 17–22, FKCP). Without further data, 1991, 1♂ (FKCP). **Egypt**, April

1996, without further data, 2♂♂, 2♀♀ (RTOC: Sco-0106), 1im.♀ (RTOC: Sco.0336), 3♀ (FKCP). Northern part, 2011, leg. A. Tolba; 3♂♂, 7♀♀, 1im.♂ (RTOC: Sco-0555). **Israel**, Hadarom, 'Arad, inside house, 2 April 1998, leg. A. Schmidt, 1♂ (RTOC: Sco-0107).

Androctonus liouvillei (Pallary, 1924): **Algeria**, 70 km from El Bayadh [= Qued Seg-geur], 850 m a.s.l., 5.VII.1986, leg. Březina, 1♀ (FKCP). **Morocco**, Oujda Province, 5 km east of El Aïoun, 34°35'N - 02°26'W, 28.I.2005, leg. R. H. Fouqué & S. Bečvář, 1♀ (FKCP). Boulemane Province, 32 km northeast of Missour, 33°15'N - 03°47'W, 29.I.2005, leg. R. H. Fouqué & S. Bečvář, 1♂ (FKCP). Djebel Kebdana, northwest of Selouane, 35°00'10"N - 02°48'35"W, 250 m a.s.l., 23.-25.IV.2009, leg. F. Kovařík, 3♂♂, 3♀♀, 2im. (FKCP). Plage Aglou, northwest of Tiznit, 29°45'N - 09°54'W, 6 m a.s.l., 6.V.2011, leg. P. Kabátek, 1♂ (FKCP). **Western Sahara**, Abattekh, south of Tan-Tan, 27°46'N - 11°32'W, 182 m a.s.l., 7.V.2011, leg. P. Kabátek, 1im. (FKCP). Saquia el Hamra, north of Smara, 26°51'N - 11°56'W, 140 m a.s.l., 8.V.2011, leg. P. Kabátek, 2im. (FKCP).

Androctonus sergenti Vachon, 1948: **Morocco**, High Atlas, southwest of Marakech, near Tiznit, 11.V. 1972, 1♂ (FKCP); Aoulouz, Al-atlas-al-Kabir, 20.IV.



Figure 24: Distribution of *Androctonus tenuissimus* sp. n. 1. Type locality (Marsa Matruh). 2. The second locality (Ad Dabah).

1992, leg. Jůza & Wrzeczionko, 1 im. ♀ (FKCP). Agadir Province, 62 km southeast of Agadir, 30°03.47'N - 09°04.98'W, 11.2. 2005, leg. R. H. Fouqué & S. Bečvār, 1 ♀, 1 juv. (FKCP); Anti-Atlas Mts., 62 km southeast of Agadir, 30°03.35'N - 09°04.4'W, 798 m a.s.l., 16.V. 2007, leg. F. Kovařík, 1 ♂, 1 ♀ (FKCP).

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References

- ACOSTA, L. E., D. M. CANDIDO, E. H. BUCKUP & A. D. BRESCOVIT. 2008. Description of *Zabius gaucho* (Scorpiones, Buthidae), a new species from southern Brazil, with an update about the generic diagnosis. *The Journal of Arachnology*, 36: 491–501.
- ARMAS, L. F. DE, R. TERUEL & F. KOVAŘÍK. 2011. Redescription of *Centruroides granosus* (Thorell, 1876) and identity of *Centruroides granosus simplex* Thorell, 1876 (Scorpiones: Buthidae). *Euscorpius*, 127: 1–11.
- CAPORIACCO, L. DI. 1932. Spedizione scientifica all' oasi di Cufra (Marzo-Luglio 1931). Scorpioni e Solifugi. *Annali del Museo Civico di Storia Naturale di Genova*, 55: 395–408.
- FET, V. & G. LOWE. 2000. Family Buthidae C. L. Koch, 1837. Pp. 54–286 in Fet, V., W. D. Sissom, G. Lowe & M. E. Braunwalder. *Catalog of the Scorpions of the World (1758–1998)*. New York: The New York Entomological Society, 689 pp.
- FRANCKE, O. F. 1977. Scorpions of the genus *Diplocentrus* Peters from Oaxaca, Mexico. *The Journal of Arachnology*, 4: 145–200.
- KOCH, C. L. 1839. Die Arachniden. Nürnberg: C. H. Zech'sche Buchhandlung, 6(1): 3–8, Figs. 432–433.
- KOVAŘÍK, F. 2009. *Illustrated catalog of scorpions. Part I. Introductory remarks; keys to families and genera; subfamily Scorpioninae with keys to Heterometrus and Pandinus species*. Prague: Clairon Production, 170 pp.
- KOVAŘÍK, F. & Z. AHMED. 2013. A review of *Androctonus finitimus* (Pocock, 1897), with description of two new species from Pakistan and India (Scorpiones, Buthidae). *Euscorpius*, 168: 1–10.
- KOVAŘÍK, F. & A. A. OJANGUREN AFFILASTRO. 2013. *Illustrated catalog of scorpions. Part II. Bothriuridae; Chaerilidae; Buthidae I. Genera Compsobuthus, Hottentotta, Isometrus, Lychas, and Sasanidotus*. Prague: Clairon Production, 400 pp.

- KOVAŘÍK, F. & S. WHITMAN 2005. Cataloghi del Museo di Storia Naturale dell'Università di Firenze - Sezione di Zoologia «La Specola» XXII. Arachnida Scorpiones. Tipi. Addenda (1998–2004) e checklist della collezione (Euscorpiinae esclusi). *Atti della Società Toscana di Scienze Naturali, Memorie*, serie B, 111 (2004): 103–119.
- LEVY, G. & P. AMITAI. 1980. *Fauna Palaestina. Arachnida I. Scorpiones*. Jerusalem: The Israel Academy of Sciences and Humanities, 92 pp.
- LOURENÇO, W. R. 2005. Nouvelles considérations taxonomiques sur les espèces du genre *Androctonus* Ehrenberg, 1828 et description de deux nouvelles espèces (Scorpiones, Buthidae). *Revue suisse de Zoologie*, 112(1): 145–171.
- LOURENÇO, W. R. 2008. A new species of *Androctonus* Ehrenberg, 1828 from Togo (Scorpiones, Buthidae). *Entomologische Mitteilungen aus dem Zoologischen Museum Hamburg*, 15(179): 37–44.
- LOURENÇO, W. R., B. DUHEM & J. L. CLOUDSLEY-THOMPSON. 2012. Scorpions from Ennedi, Kapka and Tibesti, the mountains of Chad, with descriptions of nine new species (Scorpiones: Buthidae, Scorpionidae). *Arthropoda Selecta*, 21(4): 307–338.
- LOURENÇO, W. R. & J. X. QI. 2006. A new species of *Androctonus* Ehrenberg, 1828 from Afghanistan (Scorpiones, Buthidae). *Zoology in the Middle East*, 38: 93–97.
- LOURENÇO, W. R. & J. X. QI. 2007. A new species of *Androctonus* Ehrenberg, 1828 from Mauritania (Scorpiones, Buthidae). *Boletín de la Sociedad Entomológica Aragonesa*, 40: 215–219.
- LOURENÇO, W. R., E. YTHIER & E. A. LEGUIN. 2009. A new species of *Androctonus* Ehrenberg, 1828 from Morocco (Scorpiones: Buthidae). *Euscorpius*, 89: 1–8.
- SOLEGLAD, M. E. & V. FET. 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.
- TURIEL, C. 2013. Die Gattung *Androctonus* Ehrenberg, 1828. *Arachne*, 18(5): 4–23.
- VACHON, M. 1952. Études sur les scorpions. *Institut Pasteur d'Algérie, Alger*, 1–482. [Published 1948–1951 in *Archives de l'Institut Pasteur d'Algérie*, 1948, 26: 25–90, 162–208, 288–316, 441–481. 1949, 27: 66–100, 134–169, 281–288, 334–396. 1950, 28: 152–216, 383–413. 1951, 29: 46–104].
- VACHON, M. 1974. Études des caractères utilisés pour classer les familles et les genres des scorpions (Arachnides). 1. La trichobothriotaxie en arachnologie. Sigles trichobothriaux et types de trichobothriotaxie chez les Scorpions. *Bulletin du Muséum national d'Histoire naturelle*, 3^e série, 140 (Zoologie, 104): 857–958.