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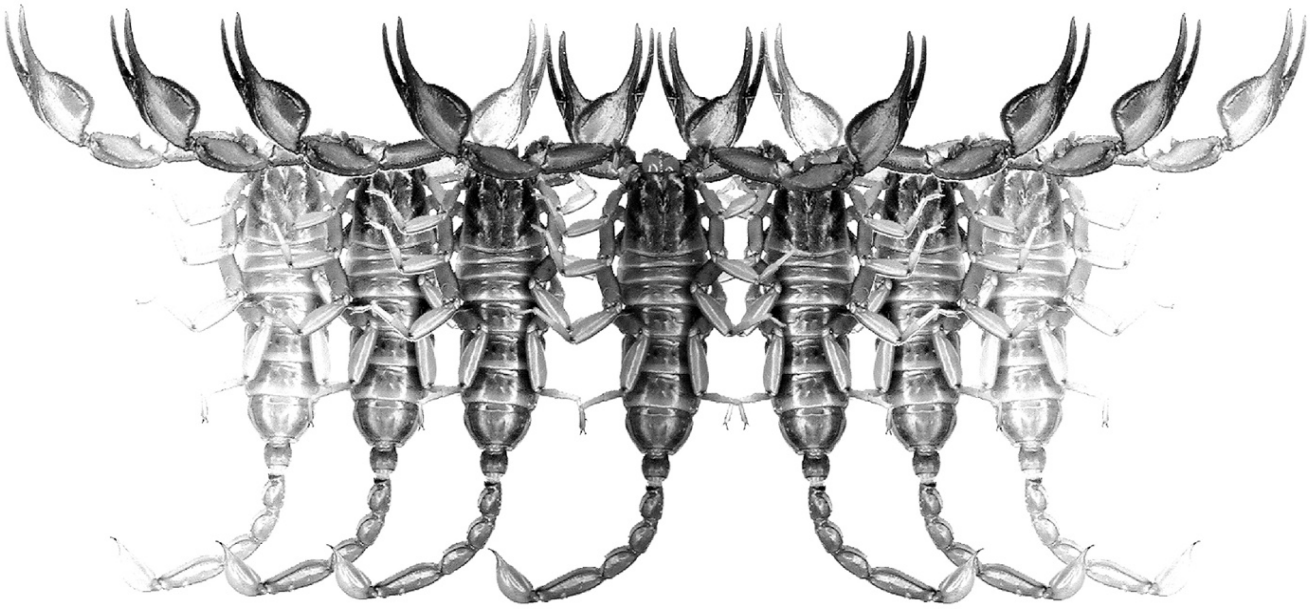

Three new species of *Androctonus* from Morocco (Arachnida: Scorpiones: Buthidae)

František Kovařík, Graeme Lowe & František Šťáhlavský

August 2025 — No. 420

Euscorpius

Occasional Publications in Scorpiology

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Euscorpius — Occasional Publications in Scorpiology. 2025, No. 420

Three new species of *Androctonus* from Morocco (Arachnida: Scorpiones: Buthidae)

František Kovařík [1], Graeme Lowe[2] & František Šťáhlavský [1]

[1] Department of Zoology, Charles University, Viničná 7, CZ-128 44 Praha 2, Czech Republic; www.scorpio.cz
[2] Monell Chemical Senses Center, 3500 Market St., Philadelphia, PA 19104-3308, USA

http://zoobank.org/urn:lsid:zoobank.org:pub:B2E6BD3D-02FD-4FF7-A17A-8A7981D985B9

Summary

New data are presented on the taxonomy and distribution of the dark species of the genus *Androctonus* Ehrenberg, 1828 in Morocco and Western Sahara. Three new species, *A. argoubi* **sp. n.**, *A. stockmanni* **sp. n.**, and *A. vaneki* **sp. n.** from Morocco are described, characterized by having metasoma I–IV ventrally punctate, a character that is well developed in *A. stockmanni* **sp. n.**, and *A. vaneki* **sp. n.**, and weakly developed in *A. argoubi* **sp. n.** Dark species from Morocco are compared with *A. sergenti* Vachon, 1948, and *A. bourdoni* Vachon, 1948. We describe and compare their external morphology, illustrating their characters comprehensively in color photographs. The hemispermatophores of two species are described and illustrated, and a map showing the distributions of the studied species is provided. Furthermore, for all three newly described species, we provided their karyograms, which are very similar (2n = 24) and demonstrate the karyotypic uniformity of the entire genus *Androctonus*.

Introduction

The Old World buthid genus *Androctonus* Ehrenberg, 1828, is widely distributed across the broad belt of Palaearctic deserts ranging from Senegal in the west, to India in the east. The long and complex geologic and biogeographic history of this vast region predicts a high species diversity for this widespread genus. Currently, 43 species are recognized, dating back 267 years to Linnaeus, 1758, who described *Scorpio australis*, the type species. However, the majority of species were described much more recently, e.g., 28 species in the last 20 years (65%), and 18 in the last 10 years (42%). The species diversity is expected to increase further with additional fieldwork and taxonomic studies applying modern methods. For example, in the Middle East, the large dark *Androctonus* that were collectively referred to single species, *A. crassicauda*, have recently been divided into a complex of least seven related species (Al-Khazali & Yağmur, 2023; Alqahtani et al., 2023; Barahoei et al., 2025; Yağmur, 2021, 2023; Yağmur et al., 2025). Similarly, in Morocco and Western Sahara, there are several large dark species including: *A. agrab* Ythier & Lourenço, 2022, *A. bourdoni* Vachon, 1948, *A. liouvillei* (Pallary, 1924), *A. mauretanicus* (Pocock, 1902), and *A. sergenti* Vachon, 1948. Here, we analyze new material from this occidental region and describe three new species related to *A. sergenti*.

Methods, Material & Abbreviations

Nomenclature and measurements generally follow Stahnke (1971), Kovařík (2009), and Kovařík & Ojanguren Affilastro (2013), with a few exceptions, e. g., trichobothriotaxy (Vachon, 1974) and hemispermatophore morphology (Kovařík et al., 2018). The term 'dorsal carinae' is applied to metasomal segments I–V (= 'dorsolateral' carinae of some other authors). Karyotypes were obtained using the spreading technique commonly applied in scorpions (e. g., Sadílek et al., 2015). Chromosomes were stained with 5% Giemsa in Sörensen phosphate buffer for 20 min.

Specimen depositories: FKCP (František Kovařík, private collection, Prague, Czech Republic; will in future be merged with the collections of the National Museum of Natural History, Prague, Czech Republic), MNHN (Muséum National d´Histoire Naturelle, Paris, France).

Morphometrics: D, depth; L, length; W, width.

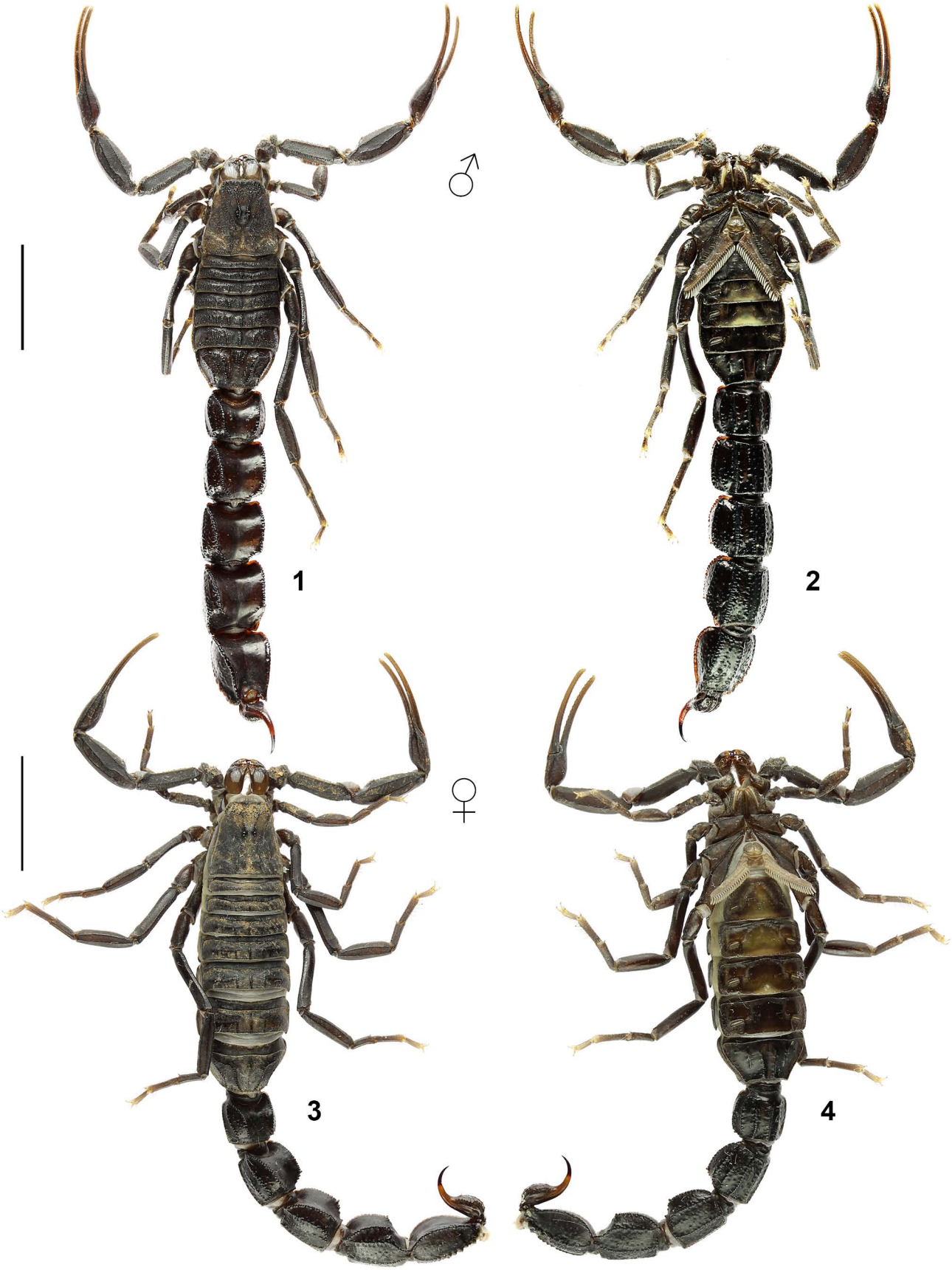
Comparative material (FKCP).

Androctonus gonneti Vachon, 1948

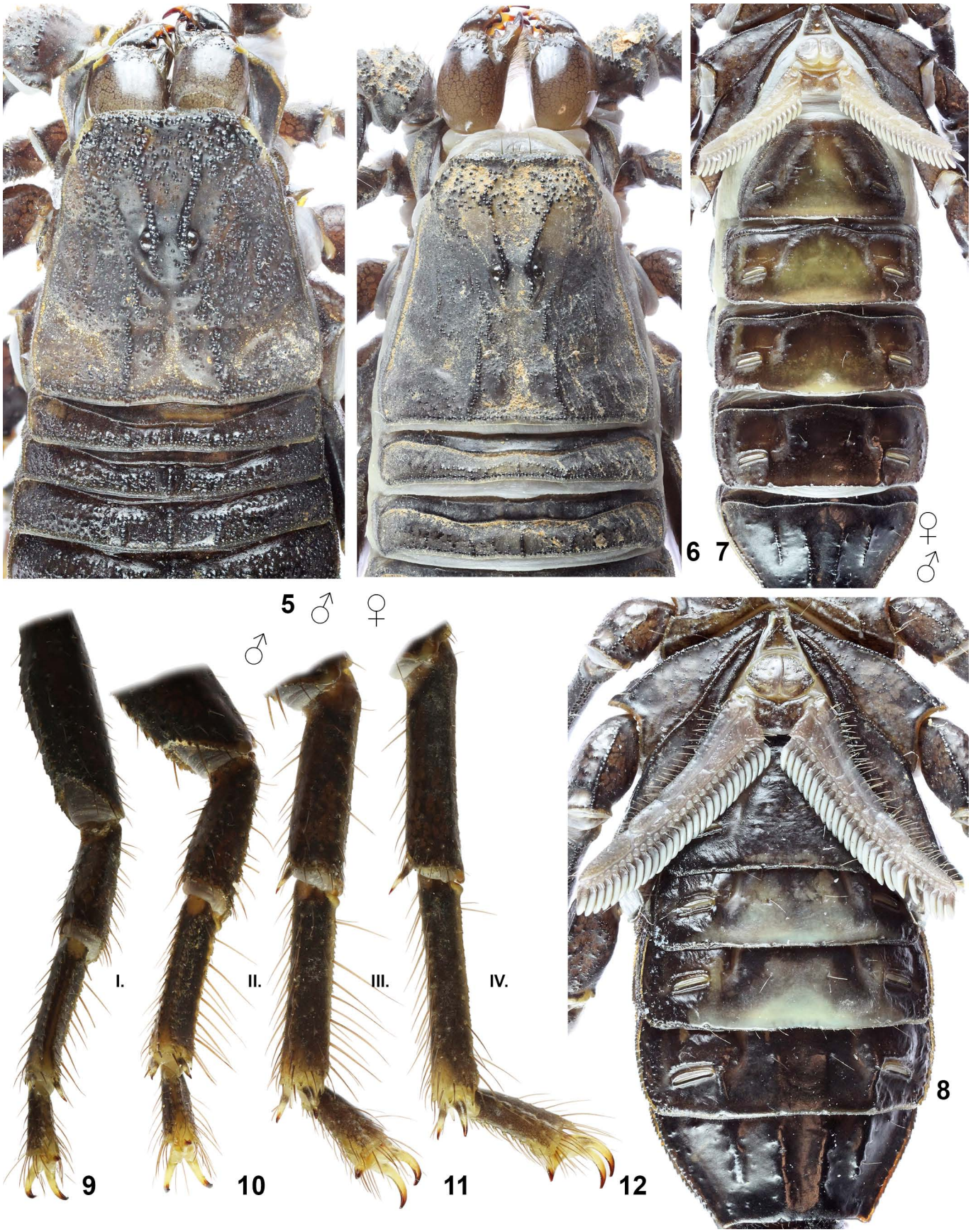
Morocco, El Ouatia env., 28.53°N 11.29°W, 2016, 2♂3♀ (Figs. 155, 162, 164, 1128), leg. M. Stockmann; El Ouatia env., 28.54605°N 10.99270°W, X.2016, 1♂ (1160), leg. M. Stockmann et C. Turiel; El Ouatia env., 28.52°N 11.29°W, 1♂ (2240), leg. M. Stockmann; Msied, 28.09221°N 10.88881° W, 1♀ (2244), leg. M. Stockmann. **Western Sahara**, Abattekh, S. Tan-Tan, 27.766°N 11.533°W, 182 m a. s. l., 7.V.2011, 1juv., leg. P. Kabátek; Saquia el Hamra N Smara, 26.85°N 11.93°W, 140 m a. s. l., 8.V.2011, 2juvs., leg. P. Kabátek.

Androctonus liouvillei (Pallary, 1924)

Morocco, Oujda Province, 5km E of El Aïoun, 34.58°N 02.43°W, 28.I.2005, 1♀, leg. R. Fouquè & S. Bečvář; Boulemane Province, 32 km NE of Missour, 33.25°N 3.78°W, 29.I. 2005, 1♂, leg. R. Fouquè & S. Bečvář; NW of Selouane, Jbel Kebdana, 250 m a. s. l., 35.00°N 02.81°W, 3♂3♀2juvs.,



Figures 1–**4**: *A. argoubi* **sp**. **n**. **Figures 1**–**2**. Male holotype in dorsal (1) and ventral (2) views. **Figures 3**–**4**. Female paratopotype in dorsal (3) and ventral (4) views. Scale bars: 10 mm (1–2, 3–4).



Figures 5–12: *A. argoubi* **sp. n.** **Figures 5, 8–12**. Male holotype, carapace and tergites I–III (5), coxosternal area and sternites (8), right legs I–IV, retrolateral aspect (9–12 respectively). **Figures 6–7**. Female paratopotype, carapace and tergites I–II (6), coxosternal area and sternites (7).

23.-25.IV.2009, leg. F. Kovařík; Figuig, 32.10°N 1.216°W, 860 m a. s. l., 1♂ (839) 1♂1♀ (1504), leg. M. Stockmann; Ain Benimathar, 33.99°N 02.03°W, 520 m a. s. l., 2016, 4♂ (1131, 1503) 3♀, leg. M. Stockmann; Morocco, Guercif, 34.23°N 03.35°W, 1♂ (1505) 1♀, leg. M. Stockmann; Erfoud campsite, 31.499°N 04.20°W, 2015, 1♂, leg. M. Stockmann.

Androctonus mauritanicus (Pocock, 1902)

Morocco, Essaouira, 30.88519°N 9.74562°W, 1♀ (1978); Rabat, 33.96°N 06.85°W 1♀, 13.IV.1993, leg. M. Janata; Rabat, 1♀, 23.IV.1995, leg. M. Snížek; Marakesh, 24.VIII.1999, 1♀, leg. V. Vignoli; Marrakesch, ca 31.65°N 7.45°W, 1♂1♀, leg. A. Ullrich; Taroudant, 30.38°N 09.20, 1♀1♂, 16.IV.1990, leg. S. Bečvář; 5 km NW of Agdz, 30.71°N 06.52°W, 1091 m a. s. l., 10.V.2007, 1juv., leg. F. Kovařík; 10km NW of Ben Slimane, 190 m a. s. l., 33.63°N 07.23°W, 2♂, 3.V.2009, leg. F. Kovařík; Tamri, 30.68°N 09.87°, 120 m a. s. l., 1♂2♀ (1511), leg. M. Stockmann; Imessouane, 30.88519°N 9.74571°W, 246 m. a. s. l., 1♂1♀ (1506), leg. M. Stockmann; M´semir, 31.703880°N 5.811467°W, 2015, 1♂1♀ (837).

Systematics

Buthidae C. L. Koch, 1837

Androctonus Ehrenberg, 1828

(Figures 1–179, Tables 1–2)

Androctonus Ehrenberg in Hemprich & Ehrenberg, 1828 (part), pl. II, fig. 1–2, 4–5, 8.

Type species. *Scorpio australis* Linnaeus, 1758.

Diagnosis. Adults 50–110 mm in length. Carapace subrectangular, granulate, with distinct anterior submedian, superciliary, central median, central lateral and posterior median carinae, the latter two usually not fused into a lyre configuration; five pairs of lateral eyes, in type 5 pattern (Loria & Prendini, 2014). Sternum type 1 (Soleglad & Fet, 2003), relatively small, and markedly triangular in shape. Tergites granulate, I–VI with 1–3 carinae, VII with 5 carinae; sternites III–VI smooth, spiracles narrow, slit-like; sternite VII with 4 carinae; metasoma I with 10 carinae, II–III with 8–10 carinae, V with 5 carinae. Metasomal segments robust, wide and deep, with strong carinae; metasoma I–IV with dorsal carinae elevated posteriorly and dorsomedian furrow excavated; metasoma V with dorsal carinae granulate; posterior margins of tergite/ sternite V, and metasoma I–III with microsetal fringes. Telson with vesicle pyriform, lacking subaculear tubercle; aculeus stout, long, strongly curved. Chelicerae with typical buthid dentition (Vachon 1963), fixed finger with two denticles on ventral surface. Pedipalps orthobothriotaxic, type Aβ (Vachon 1974, 1975); femur with d_2 on dorsal surface, e_2 distal to d_5; patella with d_3 internal to dorsomedian carina; chela with Eb_2 proximal to Eb_1, *eb* on proximal fixed finger, *db* in middle region of fixed finger, *db* proximal to or level with *est*, *dt* and *it* located on distal fixed finger; pedipalp femur with dense, compact distal external macrosetal cluster (Lowe & Tang, 2024); dentate margins of fixed and movable chela fingers with 9–16 linear, non-imbricated subrows of denticles, each flanked by single internal and external accessory denticles; movable finger typically with 3 large subterminal denticles; fixed and movable fingers with two pairs of subterminal Cruz-Armas sensilla, distal pair elongate (Lowe & Fet, 2024); male fingers with or without lobe/ notch combination on basal dentate margins. Pectines with fulcra and internal fulcra, lacking accessory internal fulcra; basal teeth and basal middle lamella unmodified; pectinal tooth counts: ♂ 24–37, ♀ 19–29. Legs III–IV with tibial spurs, legs I–III typically with bristle-combs on tarsomere I; all legs with two submedian rows of macrosetae on ventral surface of tarsomere II, and prolateral and retrolateral pedal spurs. Hemispermatophore with moderately long trunk, capsule with 3-lobed sperm hemiduct, basal lobe hook-like, flagellum folded with shorter, broader pars recta, and longer, narrower pars reflecta.

Remarks on karyotypes. We analyzed male karyotypes of three newly described *Androctonus* species from Morocco. The chromosomes of these species (Figs. 173–177) exhibit cytogenetic features typical of the family Buthidae: holocentric chromosomes, achiasmatic male meiosis, and a relatively low chromosome number (e. g., Mattos et al., 2013). The diploid sets of *A. argoubi* **sp. n.** (samples 1512, 1513, 1514, 1517, 1570, and holotype 2866, Figs. 173, 174), *A. stockmanni* **sp. n.** (holotype 1268, Figs. 175, 176), and *A. vaneki* **sp. n.** (holotype 2867, Fig. 177) each comprise 24 chromosomes, with one pair consistently much larger than the remainder. These characteristics match the karyotypes reported for all cytogenetically studied *Androctonus* species across their range (Sadílek et al., 2015; Šťáhlavský et al., 2020), supporting the hypothesis that the genus has a stable karyotype (Sadílek et al., 2015). The absence of chromosomal variation is further supported by the exclusive presence of bivalents in all observed postpachytene nuclei of *A. argoubi* **sp. n.** (Fig. 174) and *A. stockmanni* **sp. n.** (Fig. 175).

Remarks on hemispermatophores. The basal lobe (hook) of the holotype of *A. stockmanni* was noticeably shorter and more rounded than those observed in two samples of *A. sergenti* (cf. Figs. 85–86 vs. Figs. 78–79, 81–83). Vachon (1952) illustrated in drawings the outlines of the basal lobes of several species of *Androctonus*, which showed considerable variation: *A. aeneas* (small, broad based; fig. 163), *A. mauretanicus* (small, narrow, longer; fig. 185), *A. bourdoni* (small, narrow, short), *A. hoggarensis* (small, narrow, moderate length; fig. 197), *A. australis* (small, narrow, longer; fig. 207), and *A. amoreuxi* (small, short, broad; fig. 225). Comparative studies of much larger samples are needed to test whether these interspecific differences are statistically significant and useful for species level taxonomy.

Affinities. *Androctonus sergenti* Vachon, 1948 and the three new species described here are all characterized by having metasoma I–IV ventrally punctate, a character that is either quite well developed or at least indicated (cf. Figs. 169–172). Other *Androctonus* species from Morocco and Western Sahara

Dimensions (mm)		*A. argoubi* **sp. n.** ♂ holotype	*A. argoubi* **sp. n.** ♀ paratype	*A. sergenti* ♂ from Tafengha	*A. sergenti* ♀ from Tafengha
Carapace	L / W	6.96 / 7.11	6.59 / 6.45	7.41 / 7.80	8.85 / 9.14
Mesosoma	L	12.76	18.73	14.90	26.80
Tergite VII	L / W	3.98 / 7.65	4.77 / 7.36	4.78 / 8.57	6.05 / 10.63
Metasoma + telson	L	35.03	31.89	40.28	43.13
Segment I	L / W / D	4.84 / 5.80 / 5.18	4.35 / 4.80 / 4.49	5.42 / 6.28 / 5.06	5.54 / 6.52 / 5.69
Segment II	L / W / D	5.73 / 6.13 / 5.33	4.96 / 5.01 / 4.58	6.18 / 6.61 / 5.78	6.76 / 6.99 / 5.49
Segment III	L / W / D	5.76 / 6.39 / 5.01	5.18 / 5.34 / 4.34	6.34 / 6.90 / 5.77	7.02 / 7.15 / 5.69
Segment IV	L / W / D	6.46 / 6.11 / 5.14	5.96 / 5.49 / 4.03	7.60 / 6.62 / 5.12	7.94 / 6.85 / 5.65
Segment V	L / W / D	6.94 / 5.40 / 4.19	6.21 / 4.54 / 3.42	8.23 / 5.75 / 4.11	8.41 / 6.20 / 4.55
Telson	L / W / D	5.30 / 2.37 / 1.76	5.23 / 2.16 / 1.69	6.51 / 2.68 / 2.04	7.46 / 3.02 / 2.44
Pedipalp	L	26.11	24.33	28.27	31.35
Femur	L / W	6.39 / 1.87	5.95 / 1.64	6.87 / 1.88	7.68 / 2.24
Patella	L / W	7.57 / 2.63	7.06 / 2.26	8.13 / 2.62	8.71 / 2.69
Chela	L	12.15	11.32	13.27	14.96
Manus	W / D	1.98 / 2.07	1.87 / 1.72	2.19 / 2.21	2.13 / 2.28
Movable finger	L	8.69	8.22	9.84	11.01
Total	**L**	**54.75**	**57.21**	**62.59**	**78.78**

Table 1. Comparative measurements of adults of *A. argoubi* **sp. n.** and *A. sergenti*. Abbreviations: length (L), width (W, in carapace it corresponds to posterior width), depth (D).

studied here lack punctae on the ventral surfaces of metasomal segments (Fig. 164). Other diagnostic characters include: base color uniformly black or blackish; metasoma I smooth dorsally without fine granulation (cf. Fig. 52 vs. Fig. 163); pedipalp chela narrow with long fingers, always narrower than patella, chela length/width ratio 6.0–7.6 in both sexes (cf. Figs. 156–161 vs. 153–155). The base color is uniformly yellow to reddish yellow in *A. amoreuxi* (Audouin, 1825), and *A. maroccanus* Lourenço et al., 2009. Metasoma I is finely granulated dorsally in *A. liouvillei* (Pallary, 1924) (Fig. 163). The pedipalp chela is wide with shorter fingers in at least the males (chela length/width ratio 3.5–5.4 in both sexes) of *A. agrab* Ythier & Lourenço, 2022, *A. bourdoni* Vachon, 1948 (Fig. 154), *A. gonneti* Vachon, 1948 (Fig. 155), *A. maroccanus* Lourenço et al., 2009, and *A. mauritanicus* (Pocock, 1902) (Fig. 153).

Androctonus argoubi **sp. n.**

(Figures 1–40, 158–159, 165–166, 173–174, 178, Table 1)

http://zoobank.org/urn:lsid:zoobank.org:act:20069068-A7AA-4AC0-9865-B5BBAB276CA4

Type locality and type depository. **Morocco**, Argoub, 29.40518°N 10.06301°W; FKCP.

Material examined (FKCP). **Morocco**, Argoub, 29.40518°N 10.06301°W, 31.X.2024, 1♂(holotype, DNA-2866) 1♀(paratopotype) 3juvs.leg. O. Vaněk; Aguni, 29.51180°N 10.07057°W, 29.X.2024, 2♀4juvs. (paratypes), leg. O. Vaněk; Ait Aiaaza, 30.5046833°N 8.692°W, 2♂2♀(1517, 1570), leg. M. Stockmann; Tizrgane, 29.91633°N 09.02171°W, 2015-2016, 1♂ (1512), leg. M. Stockmann; Sidi Quarzeg, 29.17006°N 10.35768°W, 1♀, 2015, 2♂3♀(1513, 1514), 2017, leg. M. Stockmann; Ait Baha, 30.064684°N 9.138101°W, 1♂, 2017, leg. M. Stockmann; Targa Wassay, 29.03817°N 10.14681°W, 2015-2016, 1♀, leg. M. Stockmann.

Etymology. Named after the village of the type locality.

Diagnosis ♂♀. Adults 55–60 mm in length; base color uniformly black; pectine teeth 26–30 in males, 20–24 in females; metasoma I–IV with ventral and lateral surfaces granulate, usually weakly punctate, although punctuation may be reduced or absent; metasoma V only granulated ventrally; metasoma I–V with 10-8-8-8-5 carinae; metasoma IV length/width ratio 1.05–1.09 in both sexes; metasoma IV with dorsal carinae composed posteriorly of blunt denticles, posterior-most denticle may be enlarged; sternite V with smooth patch, large in adult males, slightly smaller in females; sternite VI–VII with 4 carinae; pedipalp fixed and movable fingers with 14–15 subrows of denticles, each flanked by external and internal accessory denticles; fingers without basal lobe/notch combination; fingers elongated, chela narrow with length/width ratio 6.0–6.4 in both sexes; tarsomere I of legs I–III with bristle combs; telson slender, vesicle small and flat, aculeus about as long as vesicle.

Description ♂♀. Adults 55 mm (males) to 57 mm (females) in length, habitus as shown in Figs. 1–4; distribution and positions of trichobothria on pedipalps as shown in Figs. 19–23, 25–26.

Figures 13–18: *A. argoubi* **sp. n. Figures 13–15**. Male holotype, metasoma and telson lateral (13), dorsal (14), and ventral (15) views. **Figures 16–18**. Female paratopotype, metasoma and telson lateral (16), dorsal (17), and ventral (18) views. Scale bars: 10 mm (13–15, 16–18).

Figures 19–40: *A. argoubi* **sp. n.**, pedipalp segments. **Figures 19–29**. Male holotype, chela dorsal (19), external (20) and ventral (21) views. Patella dorsal (22), external (23) and ventral (24) views. Trochanter and femur internal (25), dorsal (26) and ventral (27) views. Movable (28) and fixed (29) finger dentition. **Figures 30–40**. Female paratopotype, chela dorsal (30), external (31) and ventral (32) views. Patella dorsal (33), external (34) and ventral (35) views. Trochanter and femur internal (36), dorsal (37) and ventral (38) views. Movable (39) and fixed (40) finger dentition. Trichobothrial pattern is indicated by white circles (19–23, 25–26).

Coloration (Figs. 1–4). Base color uniformly black.
Carapace and mesosoma (Figs. 5–8). Carapace trapezoidal, wider than long, entire surface covered with granules of different sizes, denser in males; carinae typical for the genus, granulose; anterior margin nearly straight, weakly convex medially, bearing 8–10 symmetrically distributed, stout spiniform macrosetae. Tergites densely granulated in males and more sparsely in females; tergite VII granulated, pentacarinate, with paired lateral carinae strong and serratocrenulate; tergites I–VI tricarinate. Pectinal tooth count 26–30 in males, 20–24 in females; pectine marginal tips extend to around half of sternite V in males, and to posterior margin of sternite III in females; 3 marginal lamellae, 7–8 middle lamellae; lamellae and fulcra with numerous dark macrosetae. Sternum standard for the genus. Sternite III with bumpy surface, other sternites smooth, granulated marginally; sternite VII with four rather smooth carinae; spiracles very elongate, slit-like; sternite V with large, widely subtriangular, conspicuously pale smooth patch, more developed in males.
Metasoma and telson (Figs. 13–18). Metasoma very sparsely setose, all segments moderately robust, not extremely deep; metasoma I–III wider than long, IV–V longer than wide, all segments wider than deep; metasoma I with 10 granulated carinae, II–IV with 8 carinae, V with 5 carinae; dorsal carinae of metasoma I–IV composed posteriorly of blunt denticles, posterior-most denticle may be enlarged; metasoma I–IV with ventral and lateral intercarinal surfaces punctate and granulate, metasoma V only granulated on ventral surface; punctae may be reduced; dorsal surfaces of metasoma I–IV smooth, with several granules on metasoma I. Telson slender, vesicle small and flat, aculeus about as long as vesicle, strongly curved.
Pedipalps (Figs. 19–40). Pedipalps very long and slender, very sparsely setose, orthobothriotaxic type A-β; femur with 4 carinae; patella granulate only dorsally, with 7 carinae; chela smooth, with traces of carinae indicated; movable and fixed fingers with 14–15 subrows of denticles, each flanked by external and internal accessory denticles; pedipalp fingers of both sexes with inner side of base smooth, tubercle absent; fingers elongated, chela narrow, length/width ratio 6.0–6.4 in both sexes.
Legs (Figs. 9–12). Legs III and IV with long tibial spurs; all legs with retrolateral and prolateral pedal spurs; tarsomeres with two rows of macrosetae on ventral surface, and other macrosetae on other surfaces; bristle-combs present on legs I–III.
Measurements. See Table 1.

Affinities. The described characters distinguish *A. argoubi* **sp**. **n**. from all other species species of the genus, and are recounted in the key below. The new species is also supported by DNA phylogenetic analysis (in preparation). Some specimens can have punctae reduced or absent on the ventral surfaces of metasoma I–IV. These specimens can be distinguished from *A. liouvillei* (Pallary, 1924) (Fig. 163), a species from Morocco which also has very narrow pedipalp chelae, according to metasoma I which is finely granulated dorsally in *A. liouvillei* (Fig. 163) vs. smooth with several granules in *A. argoubi* **sp**. **n**. (Figs. 14 and 17). The shape of the pedipalp chela (length/width ratio 6.0–6.4) distinguishes *A. argoubi* **sp**. **n**. from *A. bourdoni* (length/width ratio of 4.8–5.4) (cf. Fig. 154 vs. Figs. 158–159).

Comments. We presume that some older citations of *A. bourdoni* may be referable to this new species. A clear distinction between these two species was possible only after the designation of a lectotype of *A. bourdoni* by Ythier & Lourenço (2022).

Androctonus bourdoni Vachon, 1948
(Figures 154, 162, 178)

Androctonus mauretanicus bourdoni Vachon, 1948: 315–316, figs. 183–187 (1952: 144–145, figs. 183–187)
Androctonus mauritanicus bourdoni: Fet & Lowe, 2000: 74 (complete reference list until 1998).
Androctonus bourdoni: Sadílek et al., 2015: 69–74, figs. 1–2; Ythier & Lourenço, 2022: 242–243, figs. 3–4, 18–19, tab. 1.
Androctonus mauretanicus (in part): Lourenço, 2005: 164–167.

Type locality and type depository. **Morocco**, Agadir; MNHN (lectotype designated by Ythier & Lourenço, 2022: 242–243).

Morocco, Tiznit, 29°49.487'N 09°38.132'W, 150 m a. s. l., 2016, 4♂(1129, 1516) 2♀, leg. M. Stockmann; Biougra, 30.10403°N 9.21424°W, 1♂ (1515, Fig. 154, 162), leg. M. Stockmann.

Diagnosis ♂♀. Adults 60–80 mm in length; base color uniformly black; pectine teeth 26–30 in males, 22–25 in females; metasoma I–V with ventral and lateral surfaces granulate; metasoma I–V with 10-8-8-8-5 carinae; metasoma IV length/width ratio 1.05–1.15 in both sexes; metasoma IV with dorsal carinae composed posteriorly of blunt denticles, posterior-most denticle may be enlarged; sternite V with smooth patch, large in adult males, slightly smaller in females; sternite VI–VII with four carinae; pedipalp fixed and movable fingers with 14–15 subrows of denticles, each flanked by external and internal accessory denticles; fingers with weak basal lobe/notch combination; fingers elongated, chela with length/width ratio 4.8–5.4 in both sexes; tarsomere I of legs I–III with bristle-combs; telson slender, vesicle small and flat, aculeus about as long as vesicle.

Androctonus sergenti Vachon, 1948
(Figures 41–83, 156–157, 170, 178–179, Table 1)

Androctonus sergenti Vachon, 1948: 441–445, figs. 188–190 (1952: 146–149, figs. 188–190); Fet & Lowe, 2000: 75 (complete reference list until 1998); Teruel & Kovařík, 2014: 13–14, fig. 35.

Figure 41. *A. sergenti*, male from Morocco, Anti Atlas mts., 62 km SE of Agadir, in vivo habitus.

Type locality and type depository. **Morocco**, Anti-Atlas; MNHN.

Material examined (FKCP). **Morocco**, High Atlas, SW Marakech near Tiznit, 29.68°N 9.61°W, 1♂, 11.V.1972; Tiznit, 1♂ (838), leg. M. Stockmann; Aoulouz, Al-atlas-al-Kabir, 30.55°N 8.37°W, 1juv.♀, 20.IV.1992, leg. Jůza & Wrzecionko; Agadir Province, 62 km SE of Agadir, 30.06°N 9.08°W, 11.2. 2005, 1♀1juv., leg. Fouquè R. et H.& S. Bečvář; Anti Atlas mts., 62 km SE of Agadir, 30.05°N 9.07°W, 798 m a. s. l., 16.V.2007, 1♂1♀ (Figs. 41, 170), leg. F. Kovařík; Tafengha, 2 km S Irherm, 30.073246°N 8.461766°W, 3♂3♀ (971, 1269, Figs. 42–83), leg. M. Stockmann.

Diagnosis ♂♀. Adults 55–85 mm in length; base color uniformly black; pectine teeth 23–29 in both sexes; metasoma I–IV with ventral and lateral surfaces punctate; metasoma V with ventral and lateral rather smooth, sparsely granulated, with punctae strongly reduced or absent; metasoma I–V with dorsal surfaces smooth; metasoma I–V with 10-8-8-8-5 carinae; metasoma IV length/ width ratio 1.10–1.16 in both sexes; metasoma IV with dorsal carinae composed posteriorly of blunt denticles, posterior-most denticle enlarged; sternite V with smooth patch, large in both sexes; sternite VI–VII with 4 carinae; pedipalp fixed and movable fingers with 14–15 rows of granules, each flanked by external and internal accessory denticles; fingers without basal lobe/notch combination; fingers elongated, chela narrow with length/width ratio 6.0–7.0 in both sexes; tarsomere I of legs I–III with bristle-combs; telson slender, vesicle small and flat, and aculeus about as long as vesicle, strongly curved.

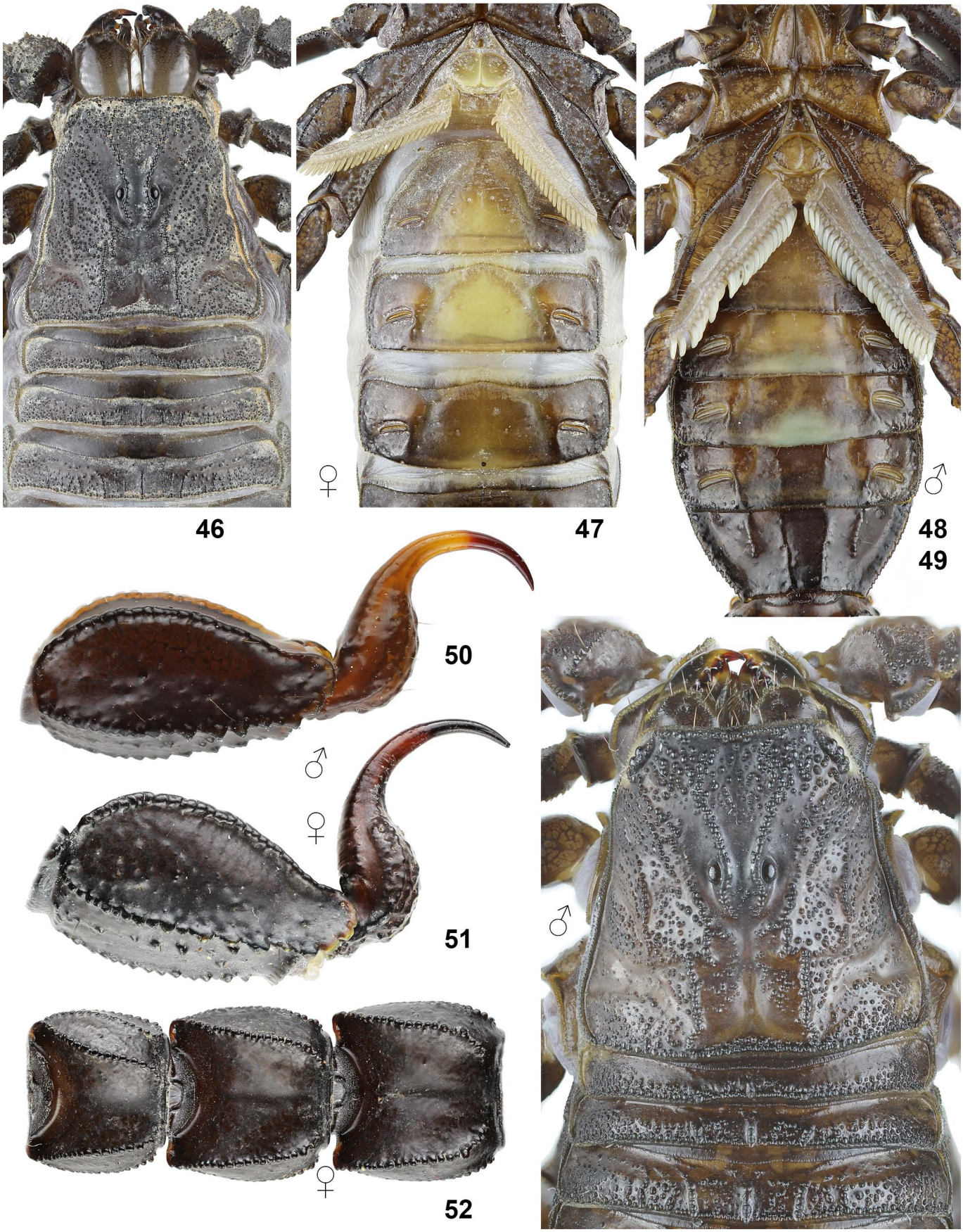
Androctonus stockmanni **sp. n.**

(Figures 84–129, 167, 172, 175–176, 178, Table 2)

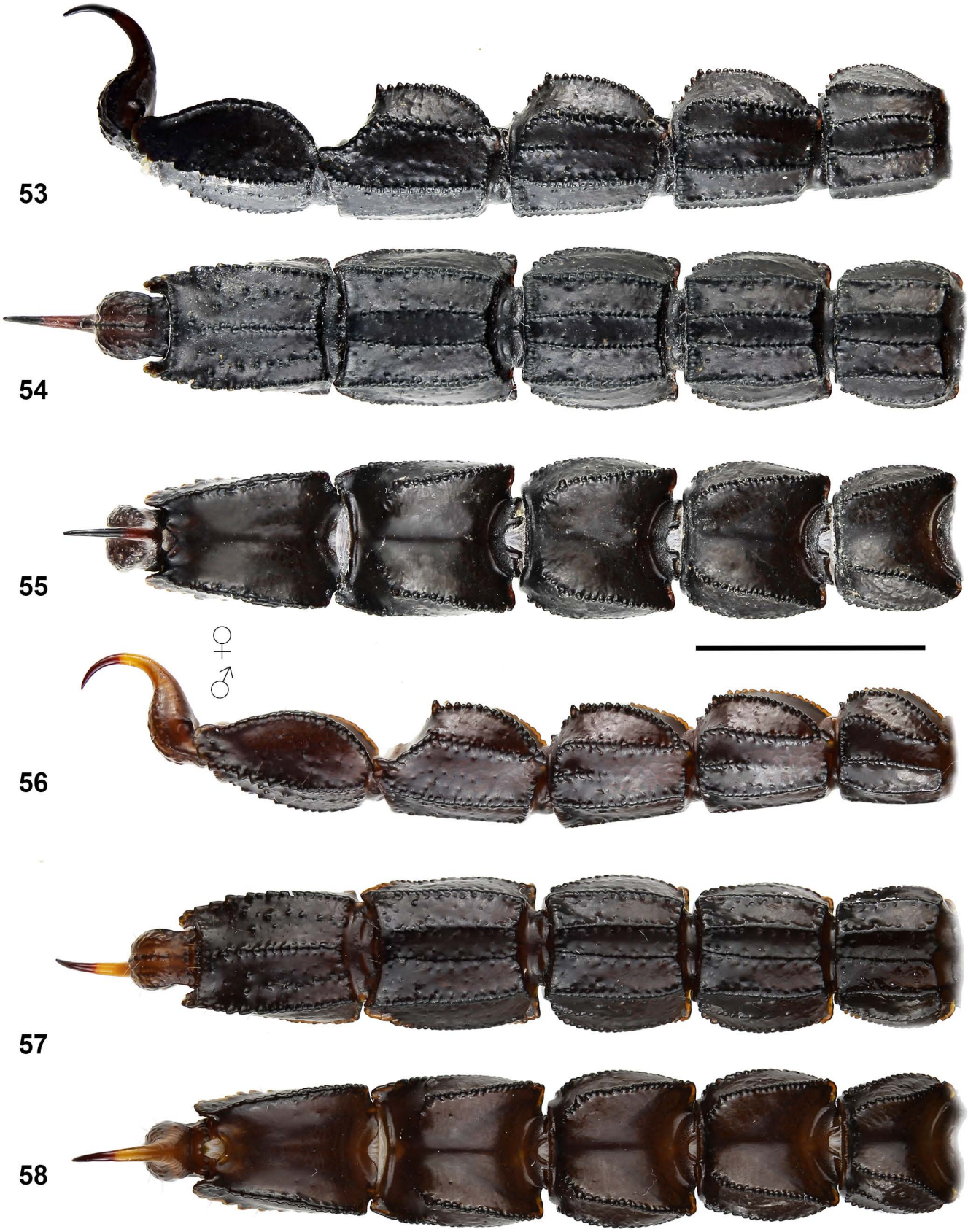
http://zoobank.org/urn:lsid:zoobank.org:act:F22390FC-8285-40A9-954D-8677168EBF3E

Type locality and type depository. **Morocco**, High Atlas Mts, Route N9 between Quarzazate and Ait Ourir; FKCP.

Figures 42–45: *A. sergenti* from Morocco, Tafengha, 2 km S Irherm, 30.073246°N 8.461766°W. **Figures 42–43**. Male in dorsal (42) and ventral (43) views. **Figures 44–45**. Female in dorsal (44) and ventral (45) views. Scale bars: 10 mm.

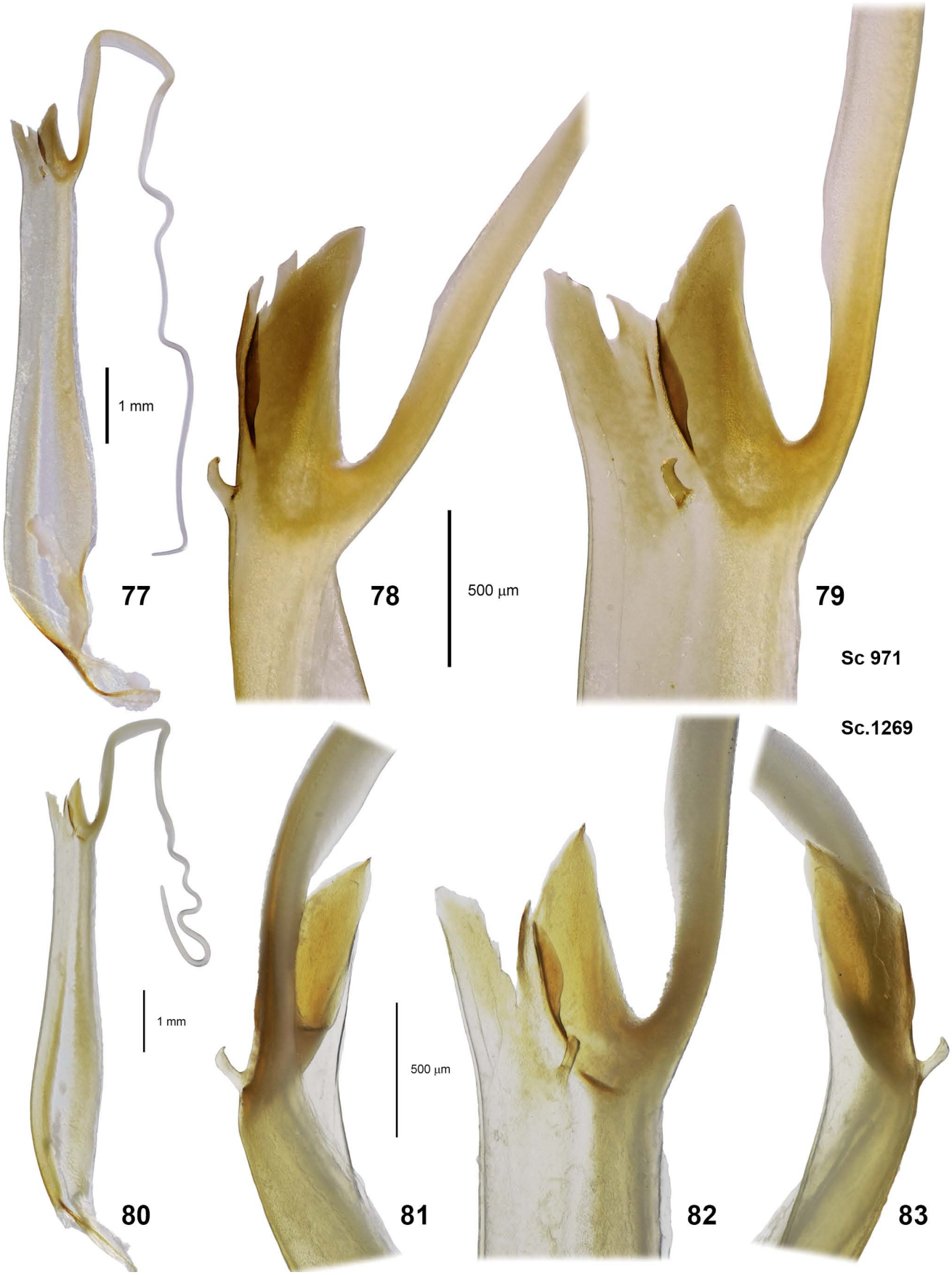


Figures 46–**52**: *A. sergenti* from Morocco, Tafengha, 2 km S Irherm, 30.073246°N 8.461766°W. **Figures 48**–**50**. Male, coxosternal area and sternites (48), carapace and tergites I–III (49), metasoma V and telson lateral (50). **Figures 46**–**47**, **51**–**59**. Female, carapace and tergites I–III (46), coxosternal area and sternites III–V (47), metasoma V and telson lateral (51), metasoma I–III dorsal (52).



Figures 53–**58**: *A. sergenti* from Morocco, Tafengha, 2 km S Irherm, 30.073246°N 8.461766°W. **Figures 53**–**55**. Female, metasoma and telson lateral (53), ventral (54), and dorsal (55) views. **Figures 56**–**58**. Male, metasoma and telson lateral (56), ventral (57), and dorsal (58) views. Scale bars: 10 mm.

Figures 59–76: *A. sergenti* from Morocco, Tafengha, 2 km S Irherm, 30.073246°N 8.461766°W. **Figures 59–70**: pedipalp segments. **Figures 59–60**, **69–70**. Male, chela dorsal (59), external (60). Movable finger (69) and fixed (70) dentition. **Figures 61–68**. Female, chela dorsal (61), external (62) and ventral (63) views. Patella dorsal (64) and external (65) views. Trochanter and femur internal (66) and dorsal (67). Movable finger dentition (69). Trichobothrial pattern is indicated by white circles (61–67). **Figures 71–76**. Left legs I–IV, retrolateral aspect in male (71–74) and right legs III–IV, retrolateral aspect in female (75–76).



Figures 77–83: *A. sergenti* from Morocco, Tafengha, 2 km S Irherm, 30.073246°N 8.461766°W. Left hemispermatophores from two males. **Figures 77**, **80**. Whole hemispermatophore, convex views. **Figures 78**, **81**. Capsule region, posterior views. **Figures 79**, **82**. Capsule region, convex views. **Figure 83**. Capsule region, anterior view. Scale bars: 1 mm (77, 80), 500 µm (78–79, 81–83).

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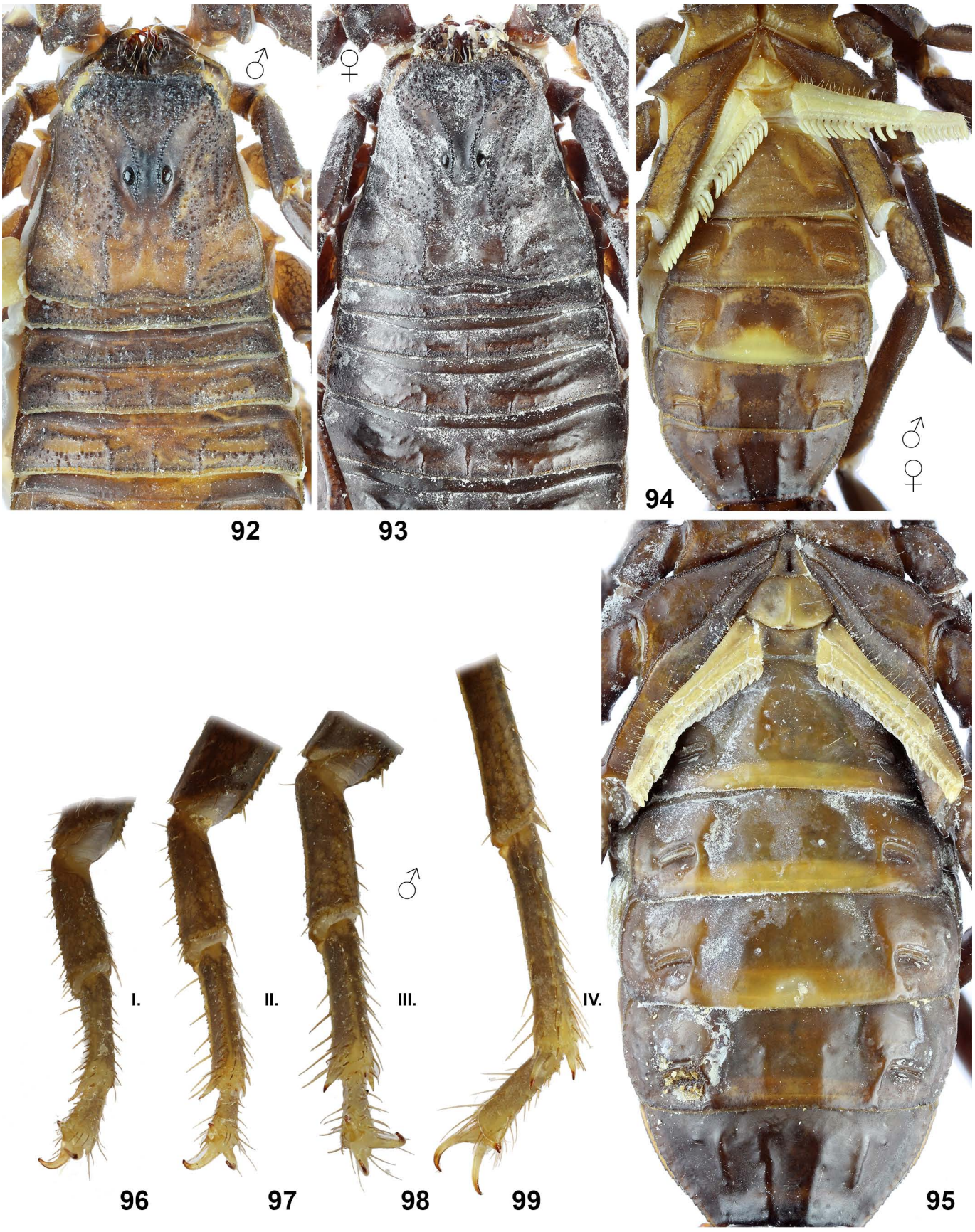
Figures 84–87: *A. stockmanni* **sp. n.**, male holotype. **Figures 84–86**: Right hemispermatophore in convex view (84), and hemispermatophore capsule in posterior (85) and convex (86) views. Scale bars: 1 mm (84), 500 µm (85–86). **Figure 87**. In vivo habitus (photographed on different substrate in laboratory).

Figures 88–91: *A. stockmanni* **sp. n. Figures 88–91**. Male holotype in dorsal (88) and ventral (89) views. **Figures 90–91**. Female paratopotype in dorsal (90) and ventral (91) views. Scale bars: 10 mm (88–89, 90–91).



Figures 92–95: *A. stockmanni* **sp. n.** **Figures 92**, **94**, **96–99**. Male holotype, carapace and tergites I–III (92), coxosternal area and sternites (94), left legs I–IV, retrolateral aspect (96–99 respectively). **Figures 93**, **95**. Female paratopotype, carapace and tergites I–IV (93), coxosternal area and sternites (95).

Dimensions (mm)		*A. stockmanni* **sp. n.** ♂ holotype	*A. stockmanni* **sp. n.** ♀ paratype	*A. vaneki* **sp. n.** ♂ holotype
Carapace	L / W	6.18 / 6.50	7.58 /8.43	6.55 /6.60
Mesosoma	L	15.10	16.50	12.40
Tergite VII	L / W	4.19 / 7.12	4.88 / 8.81	3.61 / 6.90
Metasoma + telson	L	31.59	36.80	31.88
Segment I	L / W / D	4.08 / 5.11 / 4.36	4.81 / 6.01 / 5.02	4.35 /5.21 / 4.01
Segment II	L / W / D	4.63 / 5.39 / 4.38	5.59 / 6.32 / 5.07	4.65 / 5.55 / 4.00
Segment III	L / W / D	5.07 / 5.62 / 4.32	5.86 / 6.49 / 5.22	4.98 / 5.62 / 4.00
Segment IV	L / W / D	5.87 / 5.51 / 4.12	6.75 / 6.32 / 4.69	5.87 / 5.41 / 3.80
Segment V	L / W / D	6.33 / 4.90 / 3.32	7.34 / 5.55 / 3.87	6.39 / 4.98 / 3.26
Telson	L / W / D	5.61 / 2.24 / 1.93	6.45 / 2.84 / 2.23	5.64 / 2.57 / 2.07
Pedipalp	L	24.80	28.25	25.72
Femur	L / W	6.24 / 1.61	7.34 / 1.70	6.56 / 1.70
Patella	L / W	7.26 / 2.02	8.15 / 2.40	7.53 / 2.12
Chela	L	11.30	12.76	11.63
Manus	W / D	1.48 / 1.58	1.74 / 1.77	1.79 / 1.77
Movable finger	L	7.99	9.58	8.64
Total	**L**	**52.87**	**60.88**	**50.83**

Table 2. Comparative measurements of types of *A. stockmanni* **sp. n.** and *A. vaneki* **sp. n.** Abbreviations: length (L), width (W, in carapace it corresponds to posterior width), depth (D).

Material examined (FKCP). **Morocco**, High Atlas Mts, Route N9 between Quarzazate and Ait Ourir, 2017, 1♂ (holotype, 1268) 1♀ (paratopotype), leg. M. Stockmann; High Atlas, 31.365439°N 7.371300°W, 1♀ (paratype, 1188), leg. M. Stockmann.

Etymology. The specific epithet is a patronym honoring Mark Stockmann who collected the type specimens.

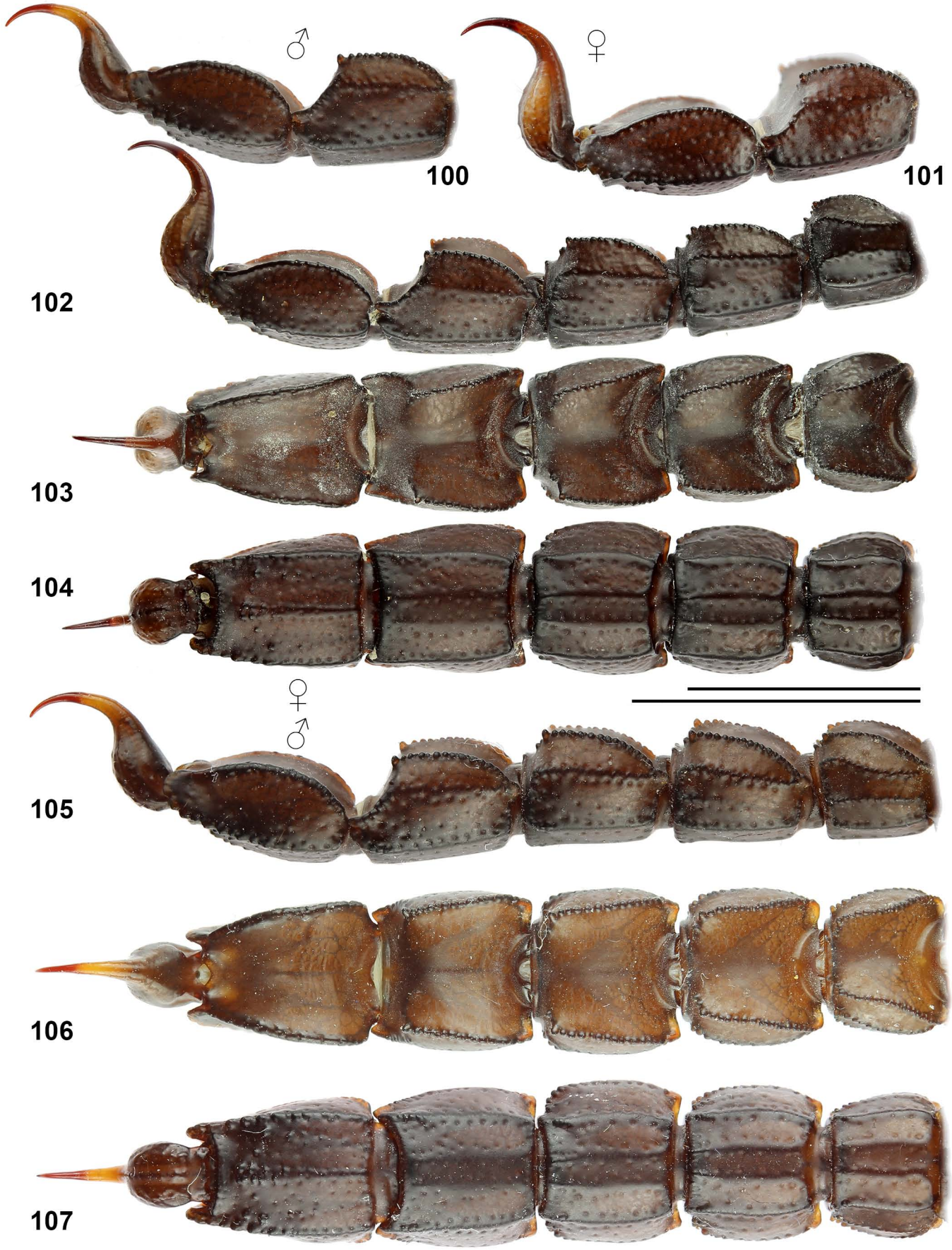
Diagnosis ♂♀. Adults 52–61 mm in length; base color uniformly black to reddish brown; pectine teeth 26 in male, 22–27 in females; metasoma I–V with ventral and lateral surfaces smooth and punctate; metasoma I–V with 10-8-8-8-5 carinae; metasoma IV length/ width ratio 1.06–1.07 in both sexes; metasoma IV with dorsal carinae composed posteriorly of blunt denticles, posterior-most denticle enlarged; sternite V with smooth patch, large in adult males, slightly smaller in females; sternite VI–VII with 4 carinae; pedipalp fixed and movable fingers with 14–15 subrows of denticles, each flanked by external and internal accessory denticles; fingers without basal lobe/notch combination; fingers elongated, chela narrow with length/width ratio 7.3–7.6 in both sexes; tarsomere I of legs I–III with bristle combs; telson slender, vesicle small and flat, aculeus about as long as vesicle; telson length/width ratio 2.50 in male.

Description ♂♀. The adults 52 mm (male) to 61 mm (female) in length; habitus as shown in Figs. 88–91; distribution and positions of trichobothria on pedipalps as shown in Figs. 108–112, 114–115.

Coloration (Figs. 88–91). Base color is uniformly black to reddish brown.

Carapace and mesosoma (Figs. 92–95). Carapace trapezoidal, wider than long, surface covered with granules of different sizes; carinae typical for the genus, granulose; anterior margin convex medially, bearing 10–12 symmetrically distributed, stout spiniform macrosetae. Tergites granulated in male, more sparsely in females; tergite VII granulated, pentacarinate, with paired lateral carinae strong and serratocrenulate; tergites I–VI tricarinate. Pectinal tooth count 26 in male, 22–27 in females; pectine marginal tips extend to posterior margin of sternite IV in male, and to half of sternite IV in females; 3 marginal lamellae, 7–8 middle lamellae; lamellae and fulcra with numerous dark macrosetae. Sternum standard for the genus. Sternite III–VI finely granulate, more so along margins, sternite VII smooth, sternites VI–VII with 4 smooth carinae; spiracles very elongate, slit-like; sternite V with large, widely subtriangular, conspicuously pale smooth patch, more developed in male.

Hemispermatophore (Figs. 84–87). Flagelliform, moderately elongate; trunk ca. 6.3 times length of capsule as measured from flagellum base to apex of sperm duct; flagellum well separated from posterior lobe of capsule; pars recta broad, laminate, ca. 2.3 length of capsule; pars reflecta narrow, cylindrical, hyaline, ca. 6 times length of capsule; sperm hemiduct with 3 lobes: a longer posterior lobe with truncate apical margin is partially fused to a shorter median lobe; the anterior lobe is of intermediate length and apically acuminate; a basal lobe is present in the form of a rather short, distally angled, blunt hook; left and right hemispermatophores were similar.



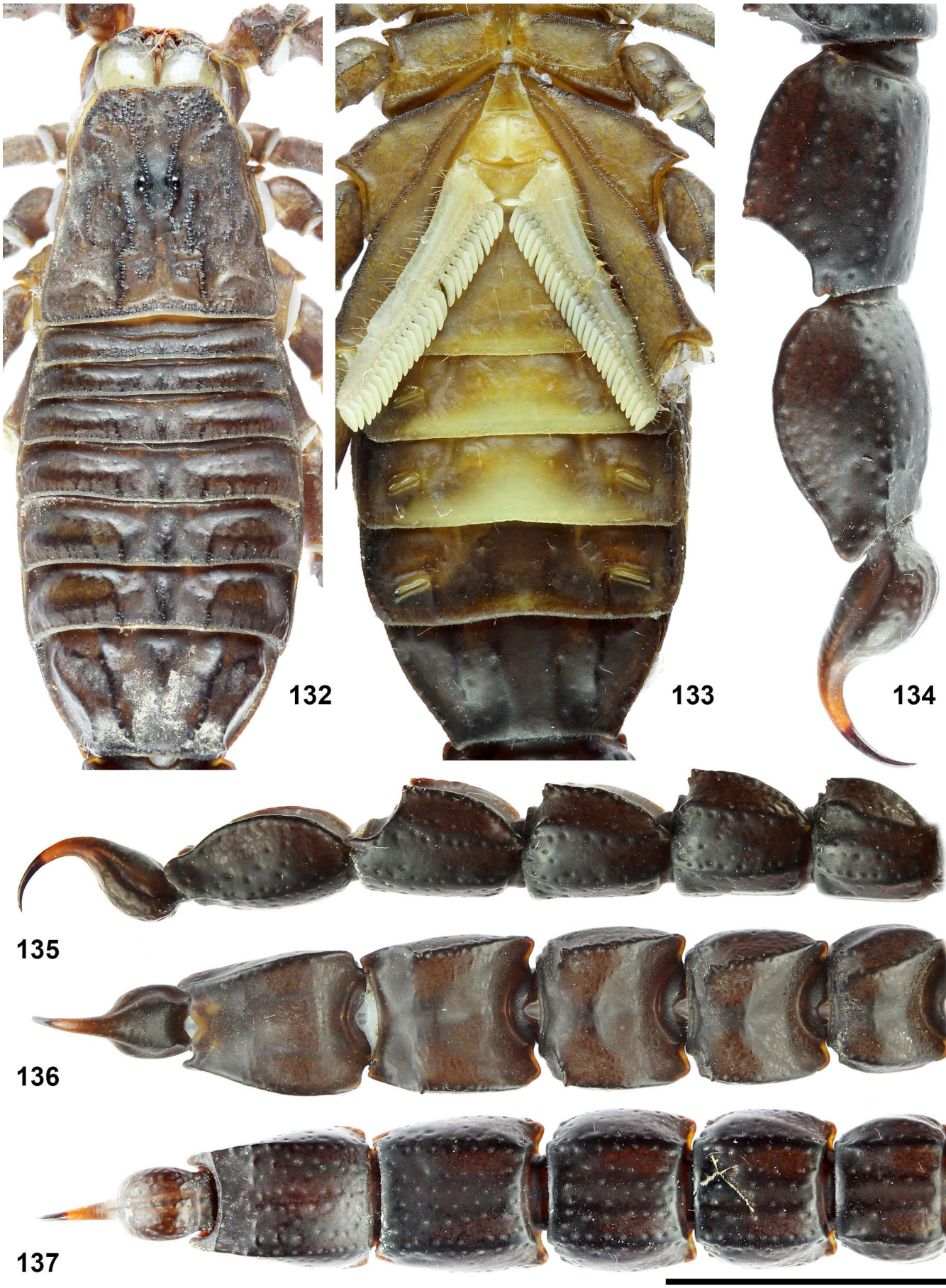
Figures 100–**107**: *A. stockmanni* **sp**. **n**. **Figures 100**, **102**–**104**. Male holotype. metasoma IV–V and telson lateral (100), metasoma and telson lateral (102), dorsal (103), and ventral (104) views. **Figures 101**, **105**–**107**. Female paratopotype, metasoma IV–V and telson lateral (101), metasoma and telson lateral (105), dorsal (106), and ventral (107) views. Scale bars: 10 mm (102–104, 105–107).

Figures 108–129: *A. stockmanni* **sp. n.**, pedipalp segments. **Figures 108–118**. Male holotype, chela dorsal (108), external (109) and ventral (110) views. Patella dorsal (111), external (112) and ventral (113) views. Trochanter and femur internal (114), dorsal (115) and ventral (116) views. Movable (117) and fixed (118) finger dentition. **Figures 119–129**. Female paratopotype, chela dorsal (119), external (120) and ventral (121) views. Patella dorsal (122), external (123) and ventral (124) views. Trochanter and femur internal (125), dorsal (126) and ventral (127) views. Movable (128) and fixed (129) finger dentition. Trichobothrial pattern is indicated by white circles (108–112, 114–115).

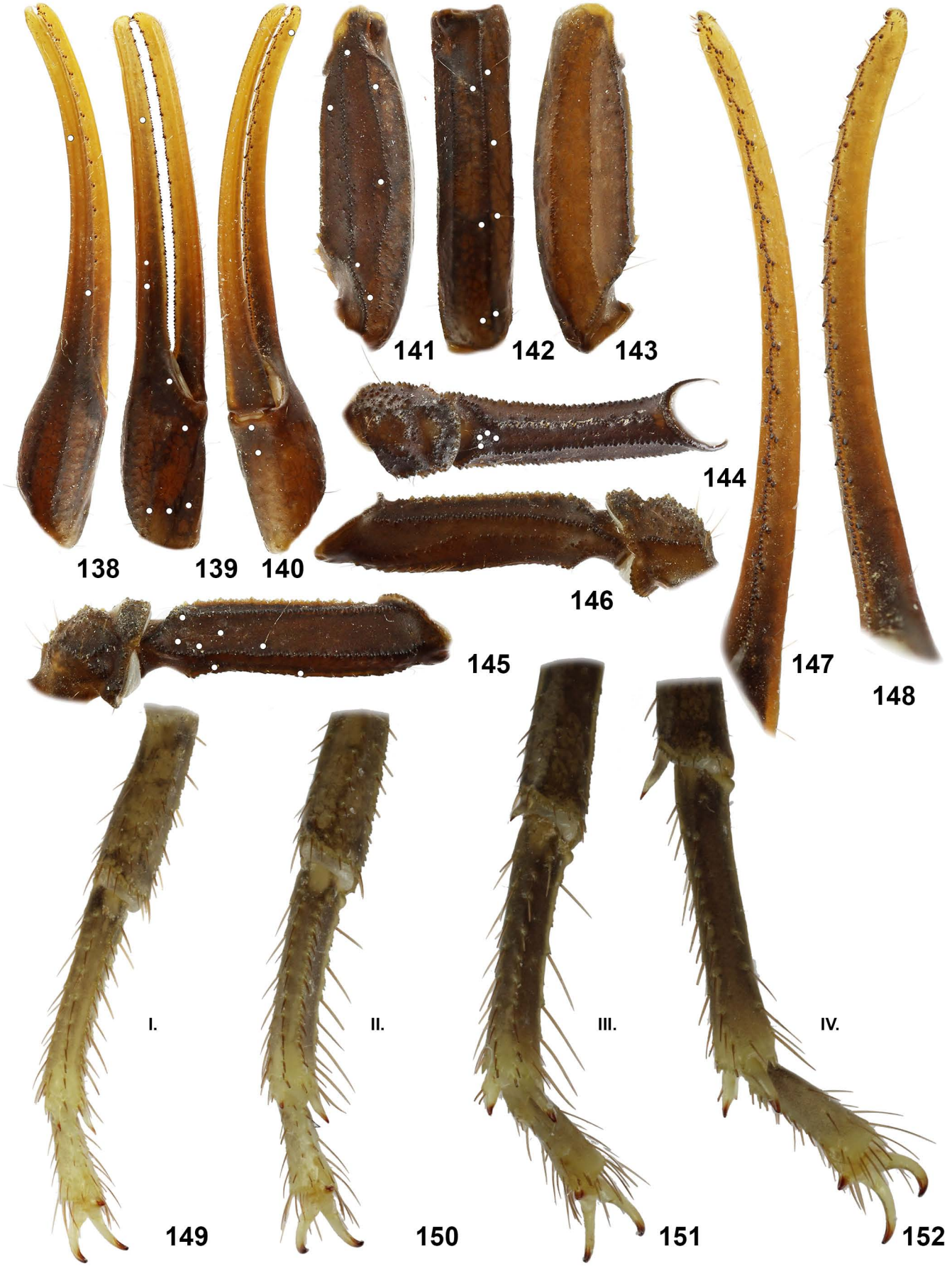
Figures 130–131. *A. vaneki* **sp. n.**, male holotype in dorsal (130) and ventral (131) views. Scale bar: 10 mm.

Metasoma and telson (Figs. 100–107). Metasoma smooth, all segments moderately robust, not extremely deep; metasoma I–III wider than long, IV–V longer than wide, all segments wider than deep; metasoma I with 10 granulated carinae, II–IV with 8 carinae, V with 5 carinae; dorsal carinae of metasoma I–IV composed posteriorly of blunt denticles, posterior-most denticle enlarged; metasoma I–V with ventral and lateral intercarinal surfaces punctate, dorsal surfaces smooth. Telson slender, vesicle small and flat, aculeus about as long as vesicle, curved.

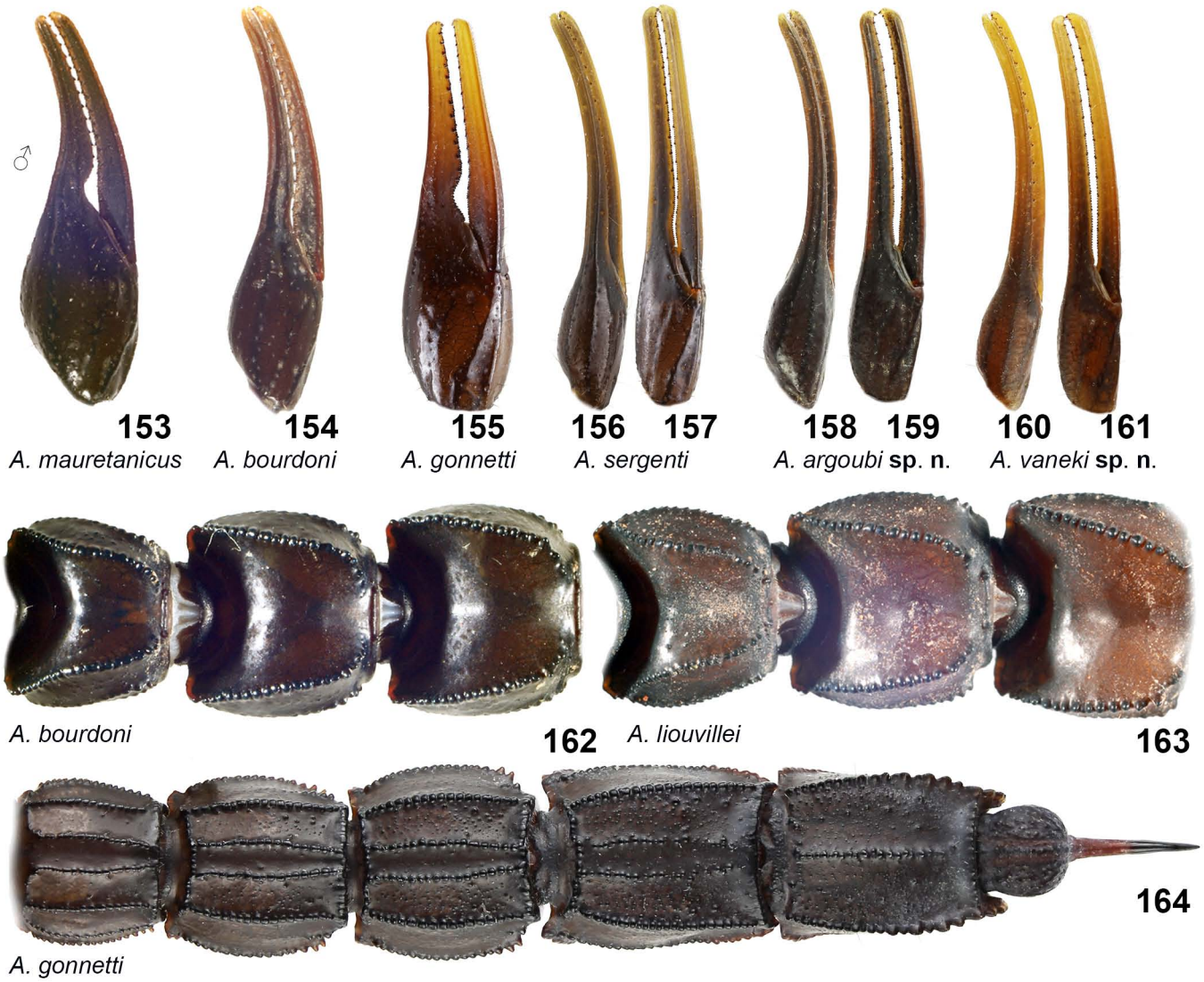
Pedipalps (Figs. 108–129). Pedipalps very long and slender, very sparsely setose, orthobothriotaxic type A-β; femur with 4 carinae; patella granulate mainly dorsally, with 7 carinae; chela sparsely granulated, with 4 partly granulated carinae; fixed and movable fingers with 14–15 subrows of denticles, each flanked by external and internal accessory denticles; pedipalp fingers of both sexes with inner side of base smooth, tubercle absent; fingers elongated, chela narrow, length/width ratio 7.3–7.6 in both sexes.



Figures 132–137. *A. vaneki* **sp. n.**, male holotype, carapace and tergites (132), coxosternal area and sternites (133), metasoma IV–V and telson lateral (134), metasoma and telson lateral (135), dorsal (136), and ventral (137) views. Scale bar: 10 mm (135–137).



Figures 138–**152**: *A. vaneki* **sp**. **n**., male holotype. **Figures 138**–**148**. Pedipalp segments, chela dorsal (138), external (139) and ventral (140) views. Patella dorsal (141), external (142) and ventral (143) views. Trochanter and femur internal (144), dorsal (145) and ventral (146) views. Movable (147) and fixed (148) finger dentition. **Figures 149**–**152**. Right legs I–IV, retrolateral aspect.



Figures 153–164: **Figures 153–161**: Comparative figures of pedipalp chela dorsal and external views of males. **Figure 153**. *A. mauritanicus* (Pocock, 1902) from Morocco, Taroudant, **Figure 154**. *A. bourdoni* Vachon, 1948 from Morocco, Biougra. **Figure 155**. *A. gonneti* Vachon, 1948 from Morocco El Ouatia env., 28.53°N 11.29°W. **Figure 156–157**. *A. sergenti* from Morocco, Tafengha, 2 km S Irherm, 30.073246°N 8.461766°W. **Figure 158–159**. *A. argoubi* **sp. n.**, holotype. **Figure 160–162**. *A. vaneki* **sp. n.**, holotype. **Figures 162–163**. Metasoma I–III in male of *A. bourdoni* Vachon, 1948 from Morocco, Biougra (162) and male of *A. liouvillei* (Pallary, 1924) from Morocco, Taroudant (163). **Figure 164**. Metasoma in ventral view, *A. gonneti* Vachon, 1948 from Morocco El Ouatia env., 28.53°N 11.29°W.

Legs (Figs. 96–99). Legs III and IV with tibial spurs, long on leg IV, reduced on leg III; all legs with retrolateral and prolateral pedal spurs; tarsomeres with two rows of macrosetae on ventral surface, and other macrosetae on other surfaces; bristle-combs present on legs I–III.
Measurements. See Table 2.

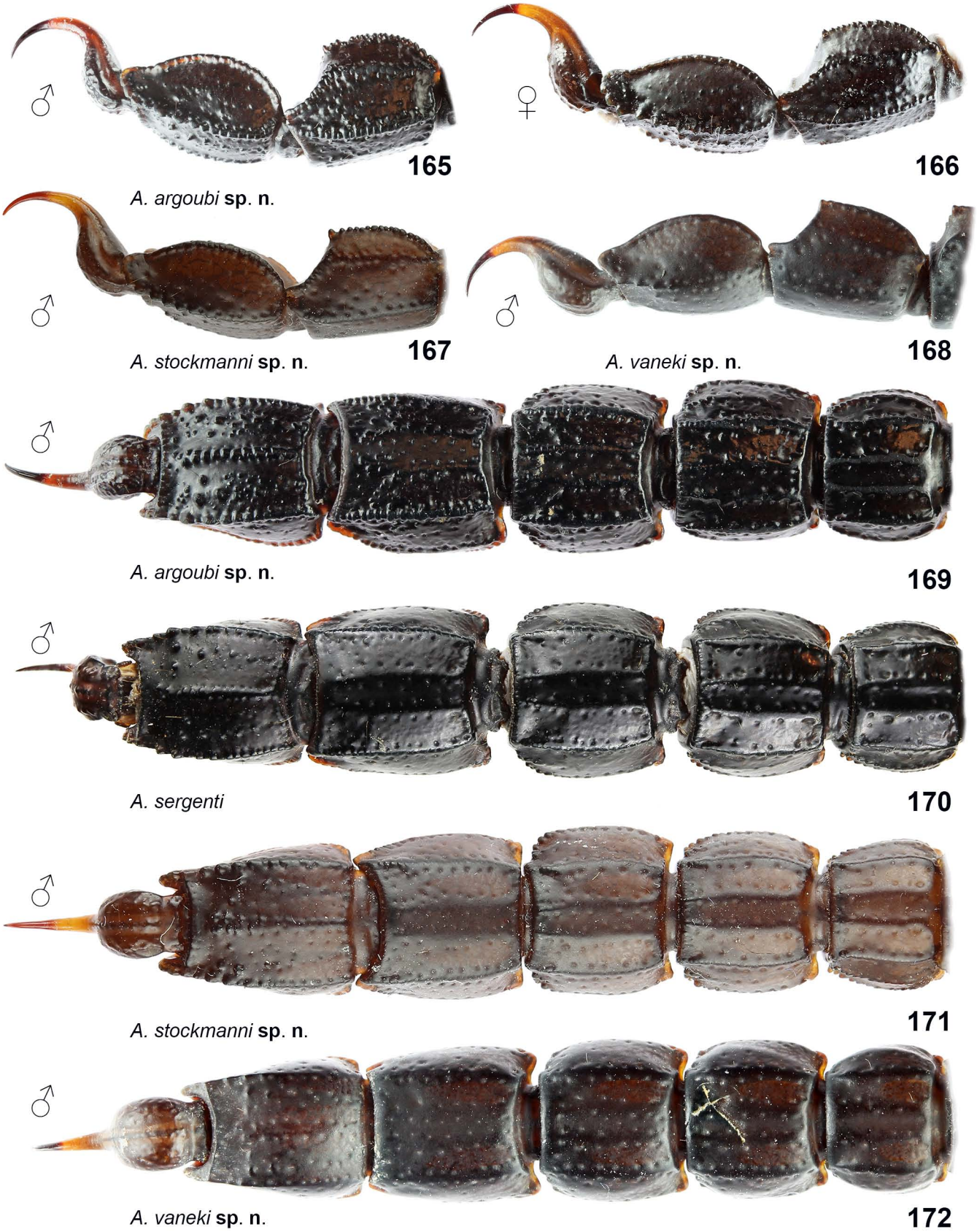
Affinities. The described characters distinguish *A. stockmanni* **sp. n.** from all other species of the genus, and are recounted in the key below. The new species is also supported by DNA phylogenetic analysis (in preparation).

Androctonus vaneki **sp. n.**

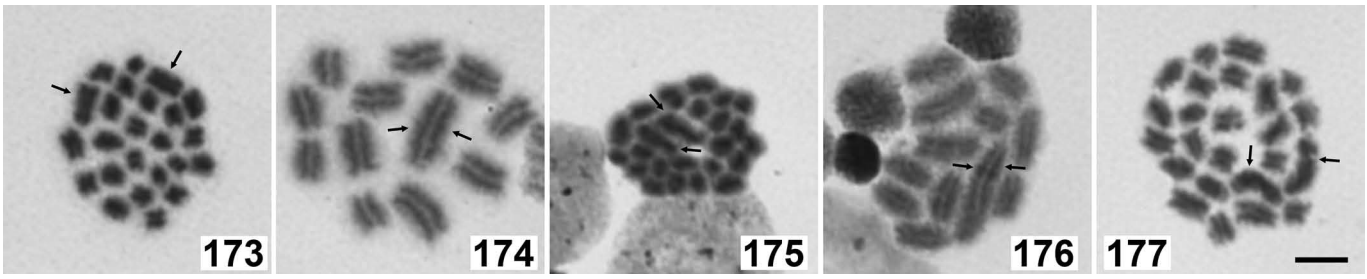
(Figures 130–152, 160–161, 168, 171, 177–178, Table 2)
http://zoobank.org/urn:lsid:zoobank.org:act:EF8F5DF9-936A-48BD-B142-BBA32444A529

Type locality and type depository. **Morocco**, Akka Nait, 29.9154600°N 7.3312725°W; FKCP.

Material examined (FKCP). **Morocco**, Akka Nait, 29.9154600°N 7.3312725°W, 28.X.2024, 1♂ (holotype, 2867), leg. O. Vaněk.



Figures 165–172: Comparative figures of metasoma. **Figures 165–168**: Metasoma IV–V and telson lateral, *A. argoubi* **sp. n.**, holotype male (165) and paratopotype female (166), *A. stockmanni* **sp. n.**, holotype male (167), *A. vaneki* **sp. n.**, holotype male (168). **Figures 169–172**: Metasoma ventral, *A. argoubi* **sp. n.**, holotype male (169), *A. sergenti* male from Morocco, Anti Atlas mts., 62 km SE of Agadir, 30.05°N 9.07°W (170), *A. stockmanni* **sp. n.**, holotype male (171), and *A. vaneki* **sp. n.**, holotype male (172).



Figures 173–**177**: Male mitotic metaphases (173, 175, 177) and postpachytene (174, 176) of *Androctonus* species. Arrows show extra large chromosomes. **Figures 173**, **174**. *A. argoubi* **sp**. **n**. (2n=24, 12 II). **Figures 175**, **176**. *A. stockmanni* **sp**. **n**. (2n=24, 12 II). **Figure 177**. *A. vaneki* **sp**. **n**. (2n=24). Scale bar: 5 μm.

Etymology. The specific epithet is a patronym honoring Ondrej Vaněk who collected the type specimen.

Diagnosis ♂. Adult male 51 mm in length; base color uniformly black to greyish brown; pectine teeth 26–28 in male; metasoma I–V with ventral and lateral surfaces smooth and punctate; metasoma I–V with 10-8-8-8-4 carinae; metasoma IV length/ width ratio 1.08; metasoma I–V with dorsal carinae smooth, with denticles reduced or absent, sternite V with large smooth patch in adult male; sternite VI–VII with 4 carinae; pedipalp fixed and movable fingers with 14–15 subrows of denticles, each flanked by external and internal accessory denticles; fingers without basal lobe/notch combination; fingers elongated, chela narrow with length/width ratio 6.5 in male; tarsomere I of legs I–III with reduced bristle combs; telson slender, vesicle small and flat, aculeus about as long as vesicle; telson length/width ratio 2.19 in male.

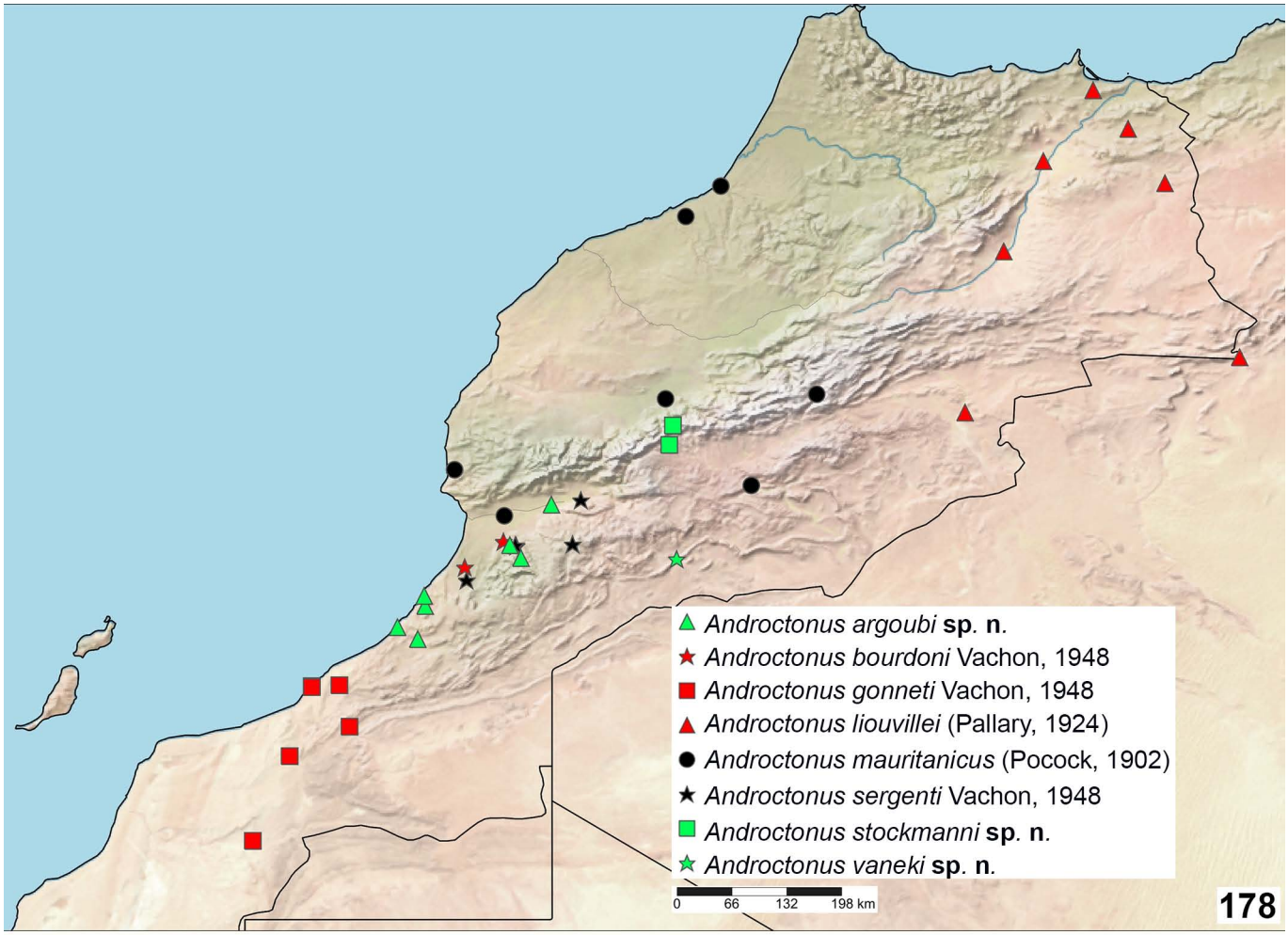
Description ♂. Adult male 51 mm in length, female unknown; habitus as shown in Figs. 130–131; distribution and positions of trichobothria on pedipalps as shown in Figs. 138–142, 144–145.
Coloration (Figs. 130–131). Base color uniformly black to greyish brown.
Carapace and mesosoma (Figs. 132–133). Carapace trapezoidal, wider than long, surface covered with granules of different sizes, densely in anterior areas, sparsely in other areas; carinae typical for the genus, granulose; anterior margin convex medially, bearing 8 symmetrically distributed, stout spiniform macrosetae. Tergites smooth with several solitary granules; tergite VII pentacarinate, with paired lateral carinae strong and serratocrenulate; tergites I–VI tricarinate, with rather smooth carinae. Pectinal tooth count 26–28 in males; pectine marginal tips extend to posterior margin of sternite IV in male; 3 marginal lamellae, 7 middle lamellae; lamellae and fulcra with numerous dark macrosetae. Sternum standard for the genus. Sternite III finely granulate along margins, other sternites smooth, sternites VI–VII with 4 smooth carinae; spiracles very elongate, slit-like; sternite V with large, widely subtriangular, conspicuously pale smooth patch.
Metasoma and telson (Figs. 134–137). Metasoma smooth, all segments moderately robust, not extremely deep; metasoma I–III wider than long, IV–V longer than wide, all segments wider than deep; metasoma I with 10 granulated carinae, II–IV with 8 carinae, V with 4 carinae; dorsal carinae of metasoma I–V smooth with denticles reduced or absent; ventral and lateral carinae smooth without granules; metasoma I–V with ventral and lateral intercarinal surfaces punctate, dorsal surfaces smooth. Telson slender, vesicle small and flat, aculeus about as long as vesicle, curved.
Pedipalps (Figs. 138–148). Pedipalps very long and slender, very sparsely setose, orthobothriotaxic type A-β; femur with 4 carinae; patella granulate mainly dorsally, with 7 carinae; chela smooth, with 4 partly granulated carinae; fixed and movable fingers with 14–15 subrows of denticles, each flanked by external and internal accessory denticles; pedipalp fingers of male with inner side of base smooth, tubercle absent; fingers elongated, chela narrow, length/ width ratio 6.5 in male.
Legs (Figs. 149–152). Legs III and IV with tibial spurs, long on leg IV, moderate on leg III; all legs with retrolateral and prolateral pedal spurs; tarsomeres with two rows of macrosetae on ventral surface, and other macrosetae on other surfaces; bristle-combs present but reduced on legs I–III.
Measurements. See Table 2.

Affinities. The described characters distinguish *A. vaneki* **sp**. **n**. from all other species species of the genus, and are recounted in the key below. The new species is also confirmed by DNA phylogenetic analysis (in preparation).

Key to studied *Androctonus* species with metasoma I–IV ventrally punctate and pedipalp chela length/ width ratio 6.0–7.6 in both sexes

1. Ventral and lateral intercarinal surfaces of metasoma V punctate and smooth (Figs. 167–168, 171–172). 2
– Ventral and lateral intercarinal surfaces of metasoma V with punctae strongly reduced or absent, often granulated (Figs. 165–166, 169–170). 3

2. Dorsal carinae of metasoma IV composed posteriorly of blunt denticles, the posterior-most denticle enlarged (Fig. 167); metasoma V with ventral median carina present; telson length/width ratio 2.50 in male. .... ***A. stockmanni* sp. n.**
– Dorsal carinae of metasoma IV smooth with reduced denticles (Fig. 168); metasoma V with ventral median carina absent. Telson length/width ratio 2.19 in male. .... ***A. vaneki* sp. n.**



Figures 178–179: Confirmed distribution of specimens of dark species of genus *Androctonus* in Morocco and Western Sahara examined for this study and deposited in the first author collection (178) and the locality of *A. sergenti* in Morocco, Anti Atlas mts., 62 km SE of Agadir, 30.05°N 9.07°W (179).

3. Ventral and dorsal intercarinal surfaces of metasoma V rather smooth, sparsely granulated (Fig. 170); dorsal intercarinal surface of metasoma I smooth (Fig. 52). .... ***A. sergenti*** Vachon, 1948
– Ventral and dorsal intercarinal surfaces of metasoma V densely granulated (Fig. 169); dorsal intercarinal surface of metasoma I with several granules (Figs. 14, 17). .... ***A. argoubi* sp. n.**

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