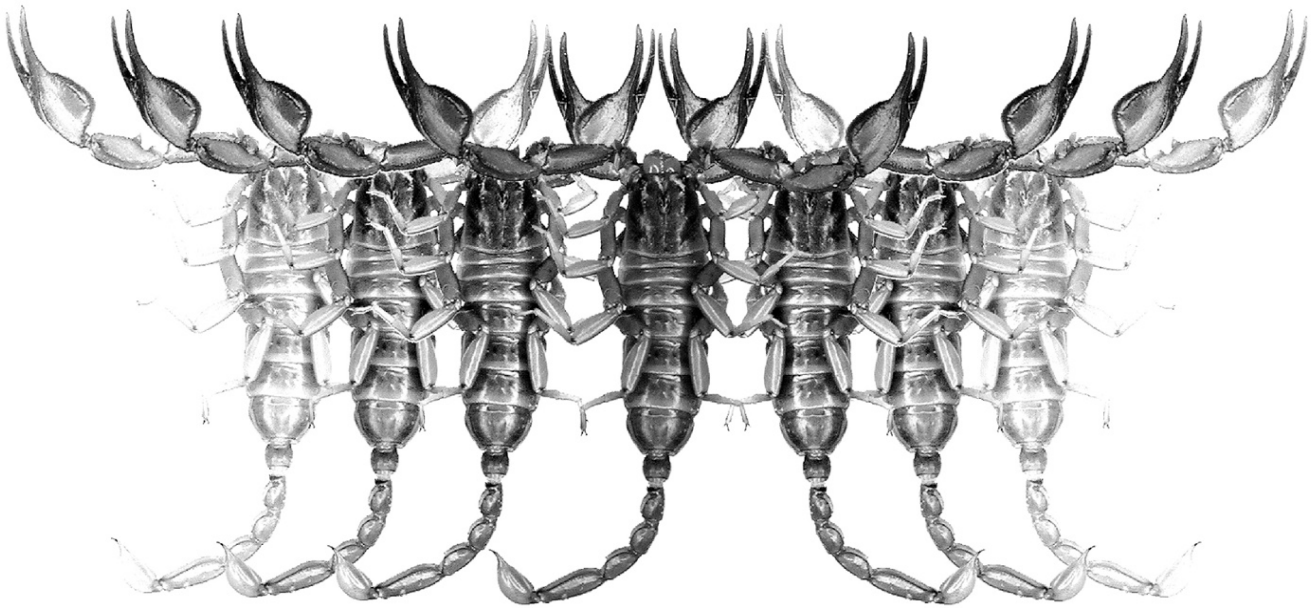


Euscorpius

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**Scorpions of the Horn of Africa (Arachnida:
Scorpiones). Part XXXIX. *Buthus pygmaeus* sp. n.
from Somaliland (Buthidae)**

**František Kovařík, Graeme Lowe, František Štáhlavský &
Hassan Sh Abdirahman Elmi**

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Scorpions of the Horn of Africa (Arachnida: Scorpiones). Part XXXIX. *Buthus pygmaeus* sp. n. from Somaliland (Buthidae)

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<http://zoobank.org/urn:lsid:zoobank.org:pub:687CCF94-407B-4CFD-B041-29C342FFEDB2>

Summary

New data are presented on the distribution of the genus *Buthus* Leach, 1815 in the Horn of Africa, mainly in Somaliland. *B. pygmaeus* sp. n. is described, fully complemented with color photographs of live and preserved specimens, as well as their habitats. In addition to the analysis of external morphology and hemispermaphors, we provide a description of the karyotype of *B. pygmaeus* sp. n. (2n=22). A key and distribution map of *Buthus* in the Horn of Africa (six species) are included.

Introduction

Kovařík et al. (2020) revised all known species of *Buthus* Leach, 1815 from the Horn of Africa, and Kovařík et al. (2022) added first report of *Buthus awashensis* from Djibouti. Analysis of a material collected in the region in 2021–2024, allowed to described another new species and created confirmed actualised map of distribution.

Methods, Material & Abbreviations

Nomenclature and measurements follow Stahnke (1971), Kovařík (2009), and Kovařík & Ojanguren Affilastro (2013), except for trichobothriotaxy (Vachon, 1974). Karyotype analyses were conducted on chromosome preparations obtained using the spreading technique, a method commonly used in scorpion cytogenetics (e. g., Kovařík et al., 2009). The chromosomes were stained with a 5% Giemsa solution in Sörensen phosphate buffer for 20 minutes. Measurements were taken from five spermatocyte nuclei using ImageJ software (version 1.45r; <http://rsbweb.nih.gov/ij>), enhanced with the Levan plugin (Sakamoto & Zacaro, 2009). Chromosome relative lengths were calculated based on the diploid set.

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).

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

Systematics

Buthidae C. L. Koch, 1837

Buthus Leach, 1815

(Figures 1–66, Table 1)

Buthus Leach, 1815: 391; Fet & Lowe, 2000: 91–97 (complete references list until 1998); Sousa et al., 2017: 15–84, figs. 1–16; Kovařík et al., 2020: 1–32, figs. 1–211, tabs. 1–3; Kovařík & Lowe, 2022: 1–5, figs. 1–20, 113.

TYPE SPECIES. *Scorpio occitanus* Amoreux, 1789

DIAGNOSIS. Total length 25–90 mm. Carapace with distinct carinae joined to form a lyre-shaped configuration, in lateral view with entire dorsal surface horizontal or nearly so. Five pairs of lateral eyes and eyespot present. Pectines with fulcra. Pectine teeth number ca 20–40. Mesosoma tergites I–VI with three carina which do not project beyond posterior margin as distinct spiniform processes. Telson without subaculear tubercle. Chelicera with typical buthid dentition, fixed finger with two ventral denticles. Orthobothriotaxic type A, dorsal trichobothria of pedipalp femur arranged in *beta*-configuration. Patellar trichobothrium *d*₃ located internal to dorsomedian carina. Trichobothrium *eb* located on fixed finger of chela. Dentate margin of pedipalp chela movable finger with distinct granules divided into 9–14 rows, 3 terminal granules and one basal terminal granule. Tibial spurs present on third and fourth pairs of legs.



Figure 1. *Buthus pygmaeus* sp. n., male paratype, in vivo habitus.

***Buthus pygmaeus* sp. n.**

(Figures 1–66, Table 1)

<http://zoobank.org/urn:lsid:zoobank.org:act:B9E28182-EADF-42ED-9AA7-BD5CE1D09176>

TYPE LOCALITY AND TYPE REPOSITORY. **Somaliland**, Laas Dhuure Village, 10.176807°N 45.983479°E, ca 540 m a. s. l.; FKCP.

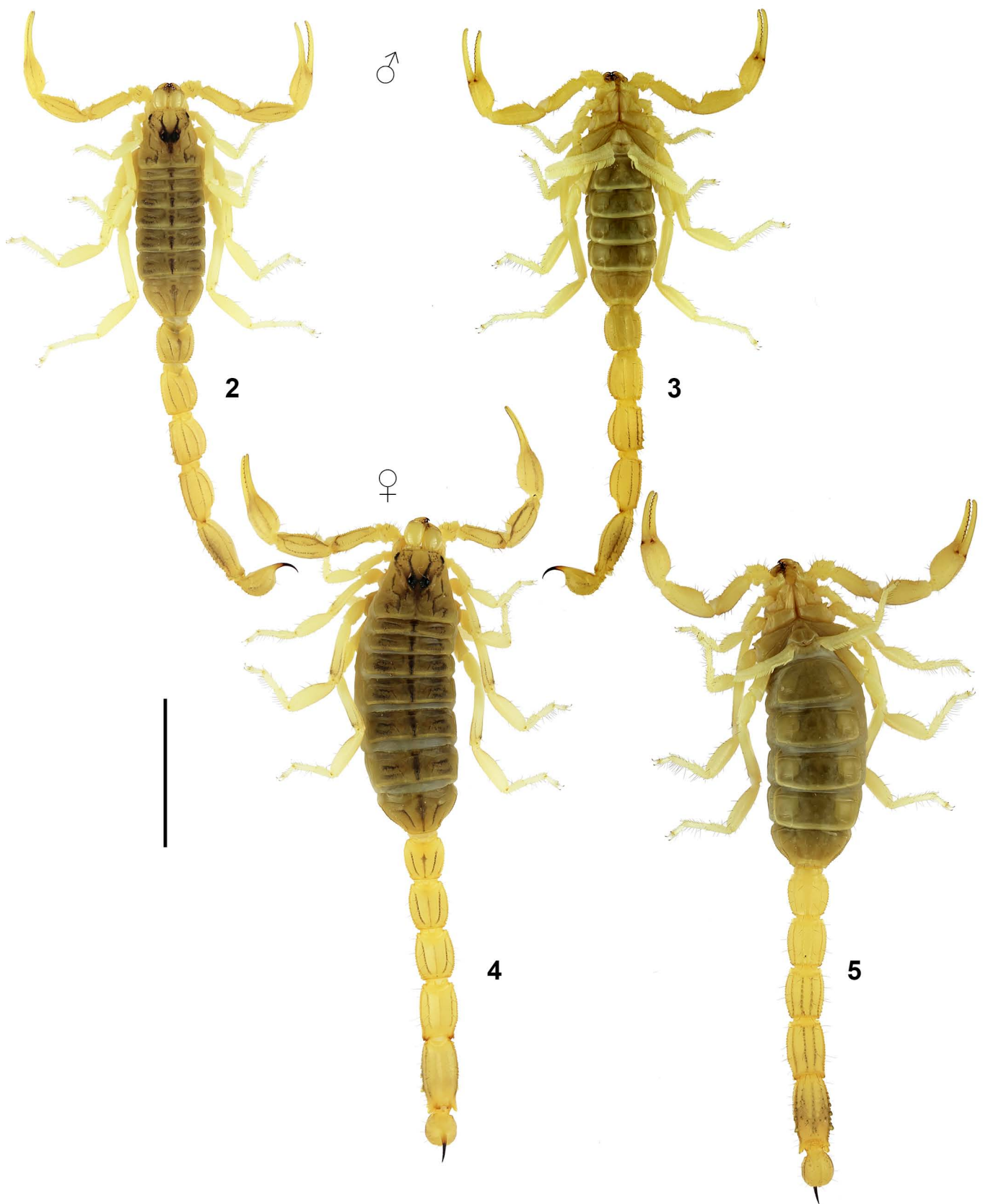
TYPE MATERIAL (FKCP). **Somaliland**, Laas Dhuure Village, 10.176807°N 45.983479°E, ca 540 m a. s. l. (Locality No. **21SK**, Fig. 66), 1♂ (holotype) 12♂ (2029, 2031, 2033) 2♀2♂juvs. (paratypes), 11–12.X.2021, leg. F. Kovařík; Laas Ciidle, 10.1763061°N 45.9742219°E, XI.2023, 1♂ (paratype, Som845), leg. H. Elmi.

ETYMOLOGY. The specific epithet is derived from the Greek adjective *pygmaíos* (πυγμαίος) meaning dwarf, in reference to the fact that the new species is the smallest known member of the genus *Buthus*.

DIAGNOSIS. Total length 31–41 mm. Base color yellow dark pattern reduced to absent; telson yellow; chelicerae pale yellow without reticulation. Pedipalp movable fingers bear 10 rows of granules, with 10–11 outer and inner denticles and fixed finger with 9–10 outer and inner denticles. Chela of pedipalp narrower in male, its length to width ratio 3.8–3.9 in females and 4.0–4.3 in males. Telson bulbous, with aculeus shorter than vesicle. Pectinal teeth number 24–25 in females and 29–33 in males.

DESCRIPTION. The adults are 31 mm (male) – 41 mm (female) long. The habitus is shown in Figs. 1–5. For position and distribution of trichobothria of pedipalps see Figs. 21–25, and 27–28. Sexual dimorphism minor: adult males with pedipalp chela slightly narrower.

Coloration (Figs. 1–5). The base color is uniformly yellow with reduced to absent, tergites yellow to grey. The pedipalps and metasoma are yellow usually with dark carina Telson is yellow often with dark pattern.



Figures 2–5: *Buthus pygmaeus* sp. n. **Figures 2–3.** Male holotype in dorsal (2) and ventral (3) views. **Figures 4–5.** Female paratype in dorsal (4) and ventral (5) views. Scale bars: 10 mm.

Dimensions (mm)		<i>Buthus pygmaeus</i> sp. n.	<i>Buthus pygmaeus</i> sp. n.	<i>Buthus pygmaeus</i> sp. n.
		♂ holotype	♀ paratype	♂ paratype, Laas Ciidle
Carapace	L / W	4.22 / 4.73	4.37 / 4.97	3.93 / 4.30
Mesosoma	L	10.44	14.04	8.56
Tergite VII	L / W	2.67 / 4.22	3.07 / 5.02	2.30 / 6.96
Metasoma + telson	L	22.18	21.96	20.97
Segment I	L / W / D	2.95 / 2.66 / 2.46	2.78 / 2.56 / 2.37	2.66 / 2.55 / 2.32
Segment II	L / W / D	3.25 / 2.53 / 2.52	3.19 / 2.41 / 2.31	3.03 / 2.41 / 2.24
Segment III	L / W / D	3.36 / 2.49 / 2.43	3.25 / 2.40 / 2.29	3.15 / 2.37 / 2.28
Segment IV	L / W / D	3.88 / 2.42 / 2.13	3.87 / 2.32 / 2.24	3.77 / 2.28 / 2.15
Segment V	L / W / D	4.64 / 2.26 / 1.81	4.70 / 2.30 / 1.91	4.39 / 2.20 / 1.81
Telson	L / W / D	4.10 / 2.01 / 1.96	4.17 / 1.98 / 1.97	3.97 / 1.76 / 1.79
Pedipalp	L	14.19	14.01	13.15
Femur	L / W	3.50 / 1.13	3.29 / 1.08	3.25 / 1.05
Patella	L / W	3.98 / 1.58	4.00 / 1.62	3.87 / 1.49
Chela	L	6.71	6.72	6.03
Manus	W / D	1.59 / 1.59	1.76 / 1.85	1.50 / 1.44
Movable finger	L	4.21	4.08	3.72
Total	L	36.84	40.37	33.46

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

Carapace and mesosoma (Figs. 43–48). The entire carapace is covered with granules small along much of the midline and large anteriorly, posteriorly and laterally. The carinae are typical for genus *Buthus*, strongly developed and composed of large, round granules. The anterior margin of the carapace is straight, and bears 10–12 long, symmetrically placed macrosetae. The tergites are granulated in posterior parts and bear very strong median carinae. A pair of denticulate lateral carinae is strong on tergites II–VI. Tergite VII is pentacarinata, with all carinae strong and granulated. The pectinal tooth count is 29–33 (4 x 29, 8 x 30, 6 x 31, 4 x 32, 2 x 33) in the males and 24–25 (3 x 24, 1 x 25) in the females. The pectinal marginal tips extend to the end of the fourth sternite or to the quarter of the fifth sternite in males and to the quarter of the fourth sternite in females. The pectines have three marginal lamellae and 8 or 9 middle lamellae. The lamellae bear numerous dark setae, each fulcrum with three to six dark setae. All sternites are smooth or very finely granulated. The seventh sternite bears four strongly developed ventral crenulate carinae.

Metasoma and telson (Figs. 6–16, 54–56). Metasoma I with 10 carinae, the metasoma II–III with 8 to 10 carinae (the lateral surface of second and third segments bears a row of granules that exceeds three-quarters of the second and one-half of the third segment length). Metasoma IV with 8 carinae and metasoma V with five carinae. The ventrolateral carinae of the fifth segment terminate in two lobes. The ventral carinae on the second and mainly third segments posteriorly with two to four large granules. The surface between the carinae is smooth. All segments are sparsely setose. The telson is bulbous, with aculeus shorter than the vesicle. The surface of the telson is

unevenly granulated and with an incomplete lateral carina.

Pedipalps (Figs. 17–42). The whole pedipalps are smooth and rather sparsely hirsute with short and long setae. The femur with four coarsely granular carinae; the ventroexternal carina is only indicated with several granules. The patella with seven coarsely granular carinae. The chela bears five carinae. The movable finger bears 10 rows of granules, with 10–11 outer and inner denticles and the fixed finger bears 9 rows of granules with 9 outer and 10 inner denticles.

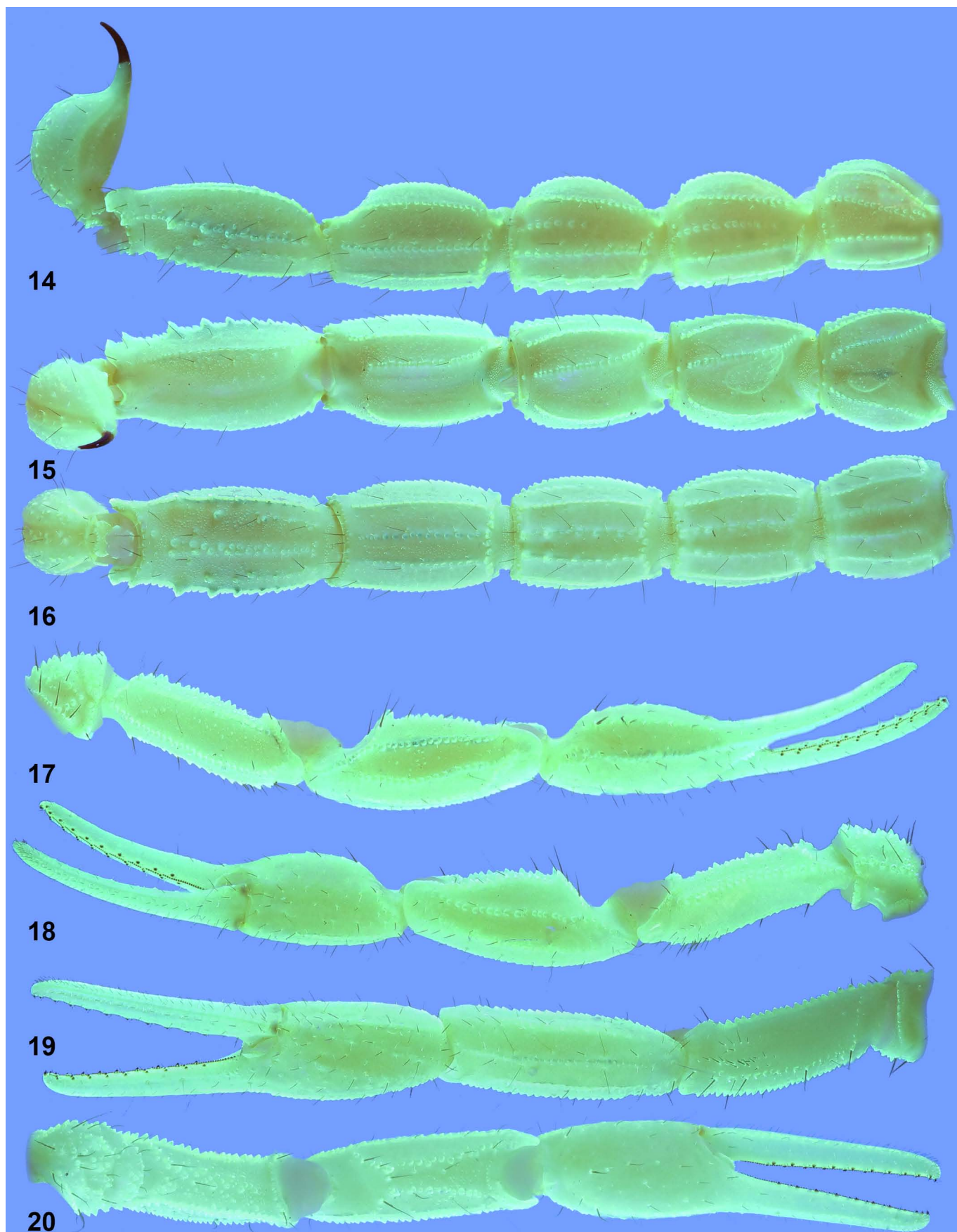
Legs (Figs. 49–52). Pairs III and IV bear long tibial spurs. Retrolateral and prolateral pedal spurs are present on all legs. The tarsomeres bear two rows of macrosetae on the ventral surface and numerous macrosetae on the other surfaces. Bristlecombs are present on the first to third legs. The femur bears four carinae and the patella bears four to six carinae. The femur and patella bear only solitary macrosetae.

Hemispermaphore (Figs. 57–61). Flagelliform, elongate, slender (Fig. 51); trunk ca. 7 times length of capsule and lobes, as measured from proximal flagellum base; flagellum well separated from capsule lobes, pars recta long, ca. 4.4 times length of capsule, 60% length of trunk, with narrow fin along part of anterior margin; pars reflecta long, narrow, hyaline, 65% length of trunk; capsule region with three sperm hemiduct lobes and one basal lobe ('3 + 1' configuration) (Figs. 58, 60); posterior lobe the largest, a lanceolate lamina with pointed apex; median lobe the smallest, distally filiform, attached to base of posterior lobe; anterior lobe intermediate in length, laminate, apically acuminate; basal lobe a long, curved, tapered hook, level with base of flagellum (Figs. 59, 61).

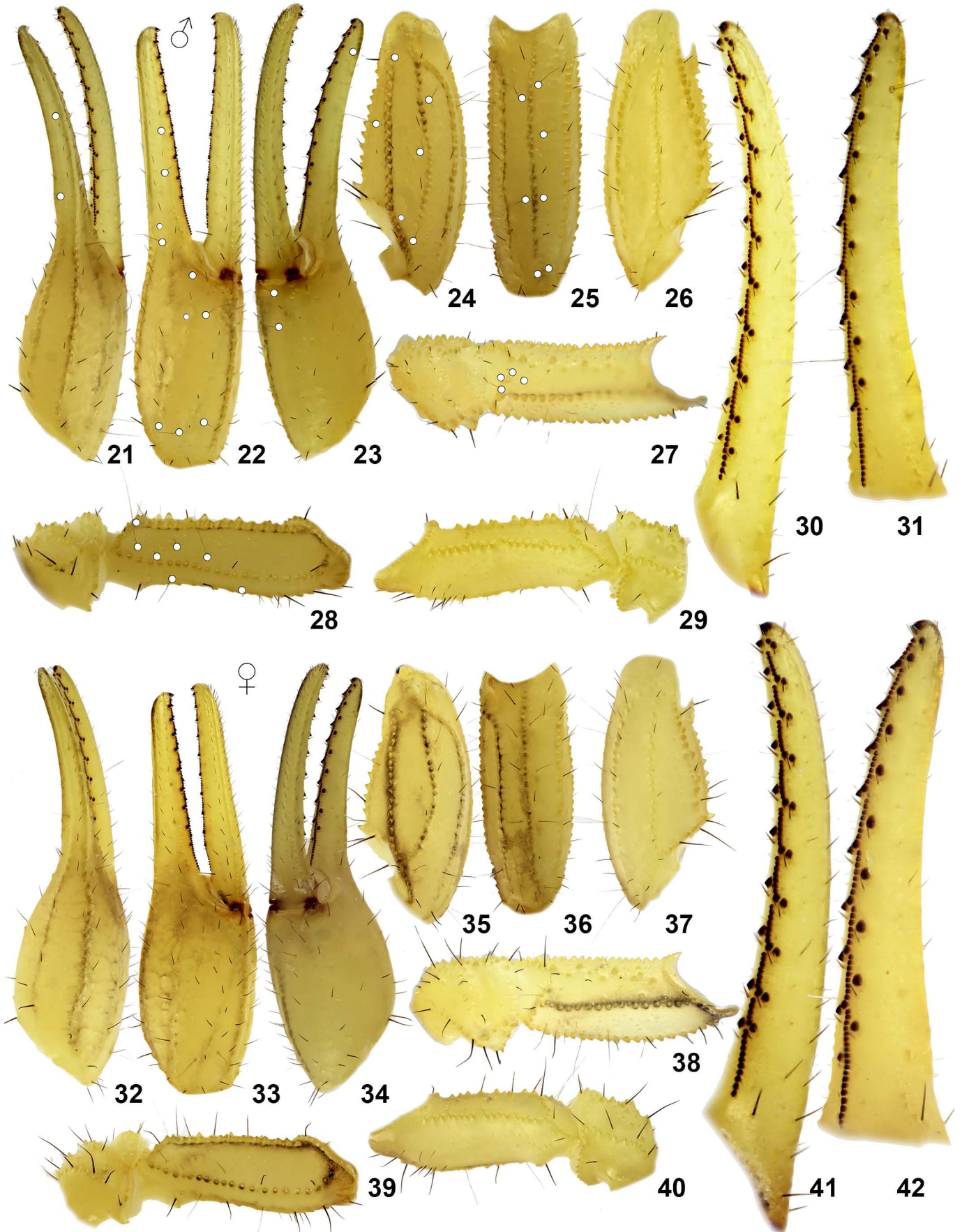
Measurements. See Table 1.



Figures 6–13: *Buthus pygmaeus* sp. n. **Figures 6, 8–10.** Male holotype, telson lateral (6), and metasoma and telson lateral (8), dorsal (9), and ventral (10) views. **Figures 7, 11–13.** Female paratype, telson lateral (7), and metasoma and telson lateral (11), dorsal (12), and ventral (13) views. Scale bars: 10 mm (8–10, 11–13).



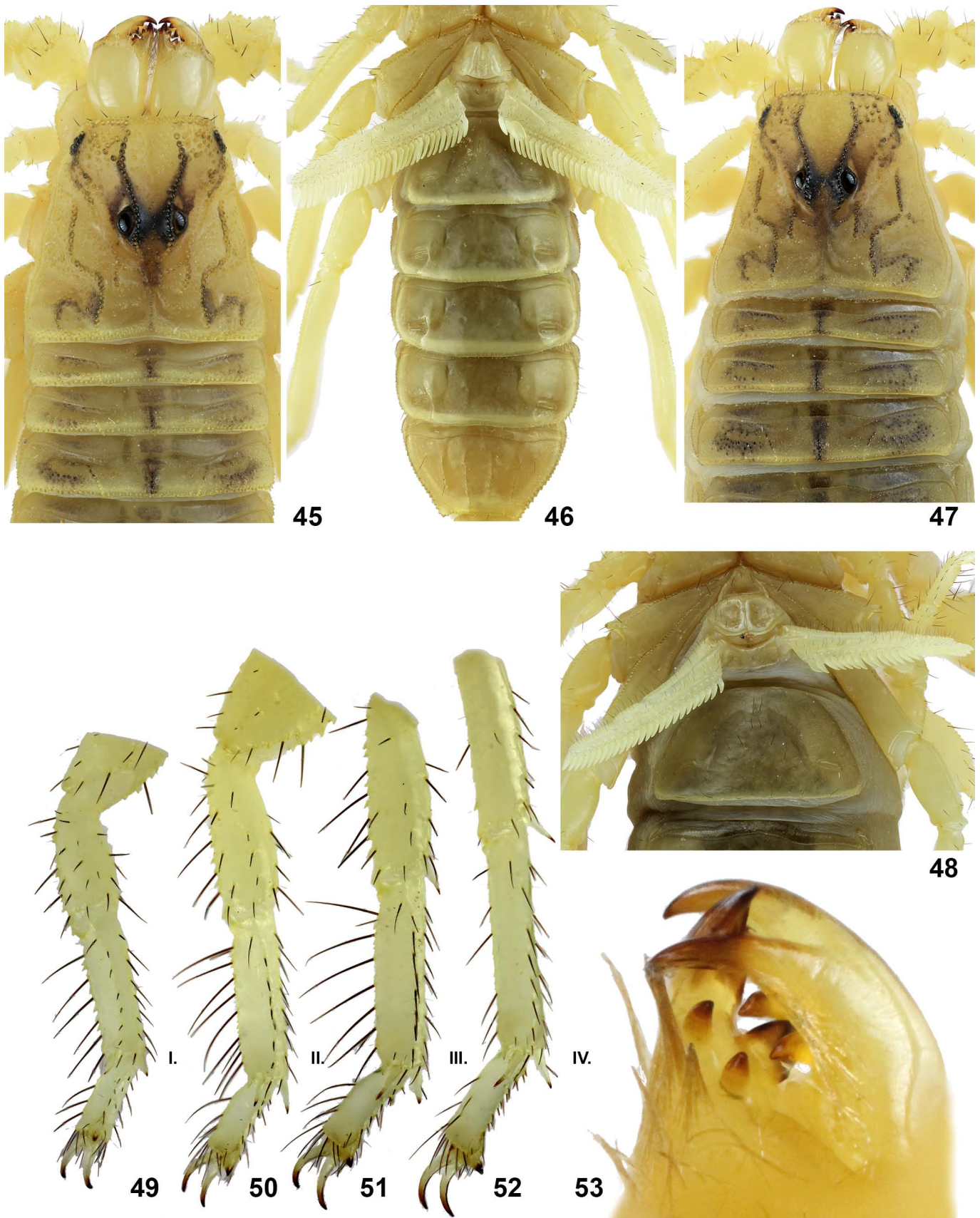
Figures 14–20. *Buthus pygmaeus* sp. n., male paratype from Laas Ciddle under UV fluorescence, metasoma and telson lateral (14), dorsal (15), and ventral (16) views. Pedipalp dorsal (17), ventral (18), external (19), and internal (20) views.



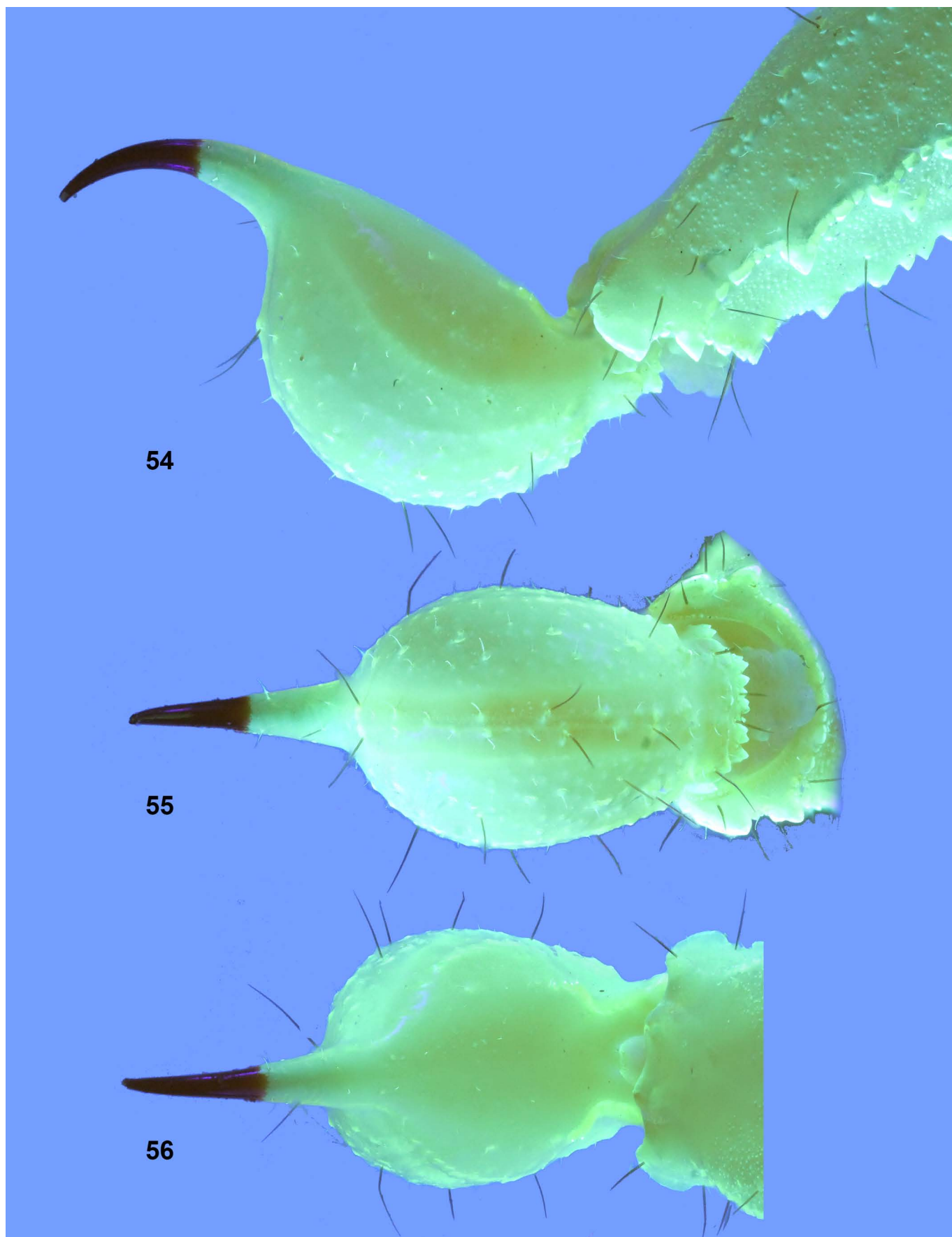
Figures 21–42. *Buthus pygmaeus* sp. n., pedipalp segments. **Figures 21–31.** Male holotype, chela dorsal (21), external (22) and ventral (23) views. Patella dorsal (24), external (25) and ventral (26) views. Trochanter and femur internal (27), dorsal (28) and ventral (29) views. Movable (30) and fixed (31) finger dentition. **Figures 32–42.** Female paratype, chela dorsal (32), external (33) and ventral (34) views. Patella dorsal (35), external (36) and ventral (37) views. Trochanter and femur internal (38), dorsal (39) and ventral (40) views. Movable (41) and fixed (42) finger dentition. Trichobothrial pattern is indicated by white circles (21–25, 27–28).



Figures 43–44. *Buthus pygmaeus* sp. n., male paratype from Laas Ciidle under UV fluorescence, carapace and tergites (43). coxosternal area and sternites (44).



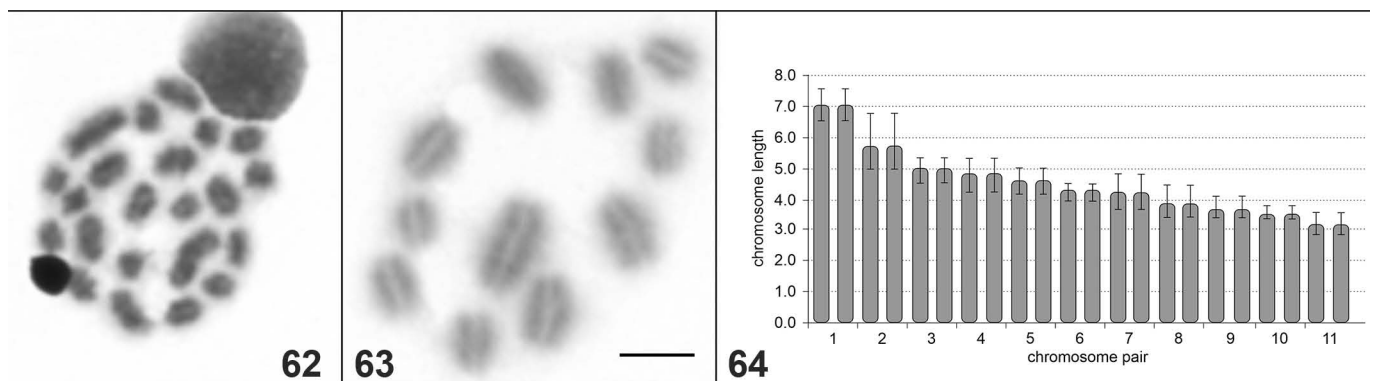
Figures 45–53. *Buthus pygmaeus* sp. n. **Figures 45–46, 49–52.** Male holotype, carapace and tergites I–III (45), coxosternal area and sternites (46), left legs I–IV, retrolateral aspect (49–52 respectively). **Figures 47–48.** Female paratype, carapace and tergites I–III (47), coxosternal area and sternite III (49). **Figure 53.** Male paratype from Laas Ciidle, left chelicera in ventral views.



Figures 54–56. *Buthus pygmaeus* sp. n., male paratype from Laas Ciidle under UV fluorescence, telson in lateral (54), ventral (55), and dorsal (56) views.



Figures 57–61: *Buthus pygmaeus* sp. n., male paratype from Laas Ciidle, left hemispermatophore. **Figure 57.** Whole hemispermatophore, showing flagellum, capsule, trunk and pedicel. **Figures 58–59.** Capsule region showing sperm hemiduct lobes, hook-like basal lobe and base of flagellum, in convex (58) and posterior (59) views. **Figures 60–61.** Enlarged view of capsule region in convex (60) and posterior (61) views. Figs. 57–59: natural colors in reflected and transmitted white light; Figs. 60–61: colors in polarized light, with differential interference contrast. Scale bars: 1 mm (57), 400 µm (58–59), 200 µm (60–61).

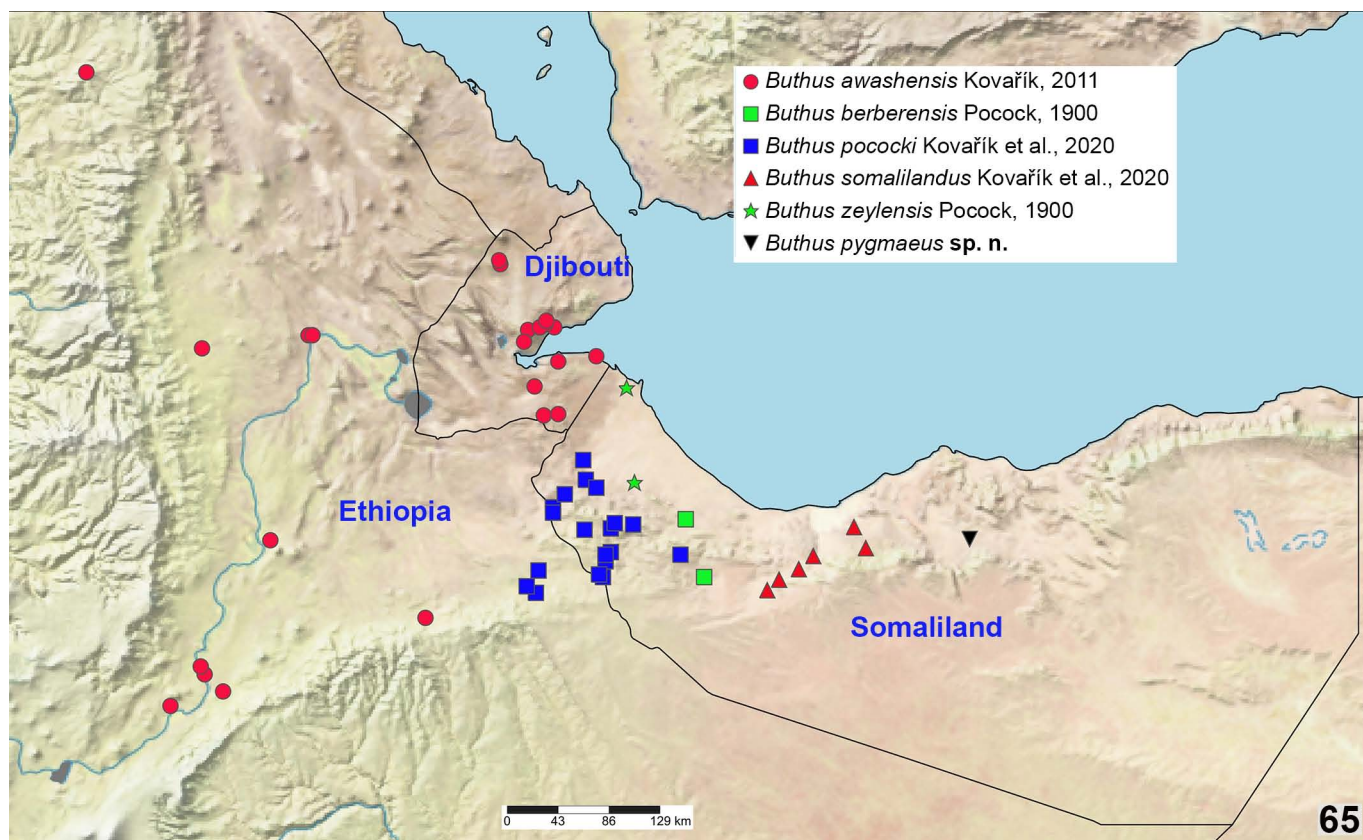


Figures 62–64: Chromosomes of *Buthus pygmaeus* sp. n. Mitotic metaphase of sample S2029 (62), mitotic metaphase of sample S2031 (63), and ideogram (64). In the ideogram, the y-axis represents the percentage of chromosome relative to the diploid set, lines indicate minimum and maximum values). Scale bar: 5 µm.

Karyotype (Figs. 62–64). We analyzed three male paratypes (S2028, S2031, S2033). The male chromosomes display features characteristic of the family Buthidae, including holocentric chromosomes, achiasmatic meiosis in males, and generally low chromosome numbers (see Schneider et al., 2024). The karyotype comprises 22 chromosomes (Fig. 62) a number consistent with all seven *Buthus* species karyotyped to date (Schneider et al., 2024). Another notable characteristic of the genus is the presence of a distinctly large chromosome pair. In *Buthus pygmaeus* sp. n., this first pair is similarly prominent, with each chromosome accounting for 7.58% of the diploid complement. The remaining chromosomes decrease gradually in length, ranging from 4.98% to 2.86% of the haploid set (Fig. 64). In

all analyzed specimens, only bivalents were observed during postpachytene (Fig. 63).

DISCUSSION. The long, narrow, hook-like basal lobe of the hemispermatophore is similar in shape to those described from other species of *Buthus*: *B. occitanus* (Vachon, 1952: 244, fig. 341; 267, figs. 377–378), *B. atlantis* (Vachon, 1952: 251, fig. 361), *B. maroccanus* (Vachon, 1952: 257, fig. 368), *B. tunetanus* (Vachon, 1952: 283, fig. 399), *B. mardochei* (Vachon, 1952: 287, fig. 407; 293, fig. 415; 297, fig. 422; 302, fig. 432), *B. malhommei* (Vachon, 1952: 306, fig. 440), and *B. paris* (Vachon, 1952: 310, fig. 448). The shape of the basal lobe is potentially diagnostic for some buthid genera, supporting placement of the new species under the genus *Buthus*.



Figures 65–66: Confirmed distribution of the genus *Buthus* in Horn of Africa (65) and type locality of *B. pygmaeus* sp. n. (66).

AFFINITIES. The described features distinguish *B. pygmaeus* sp. n. from all other species of the genus. They are recounted in the key below. *B. pygmaeus* sp. n. is the smallest of the species from Horn of Africa.

Key to the species of *Buthus* in the Horn of Africa

1. Pedipalp movable fingers with 10–11 outer and inner denticles. 2
– Pedipalp movable fingers with 12 outer and inner denticles. 3
2. Adults are 42 mm (male) – 55 mm (female) long. Pedipalps are yellow without dark carina in adults.
..... *B. somalilandus* Kovařík et al., 2020
– Adults are 31 mm (male) – 41 mm (female) long. Pedipalps are yellow usually with dark carina.
..... *B. pygmaeus* sp. n.
3. Telson orange to brown (figs. 193–194 in Kovařík et al., 2020). 5
– Telson yellow (figs. 191–192 in Kovařík et al., 2020). ... 4
4. Mesosoma, legs, and pedipalps with strong dark pattern (figs. 176–177 in Kovařík et al., 2020). Chelicerae pale yellow, reticulated only in anterior part.
..... *B. awashensis* Kovařík, 2011
– Base color yellow, dark pattern usually reduced (figs. 180–181 in Kovařík et al., 2020). Chelicerae pale yellow without reticulation. *B. pococki* Kovařík et al., 2020
5. Mesosoma, legs, and mainly pedipalps with strong dark pattern (figs. 178–179 Kovařík et al., 2020). Chelicerae pale yellow, reticulated only in anterior part.
..... *B. berberensis* Pocock, 1900
– Base color yellow, dark pattern reduced (figs. 182–185 Kovařík et al., 2020). Chelicerae pale yellow without reticulation. *B. zeylensis* Pocock, 1900

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