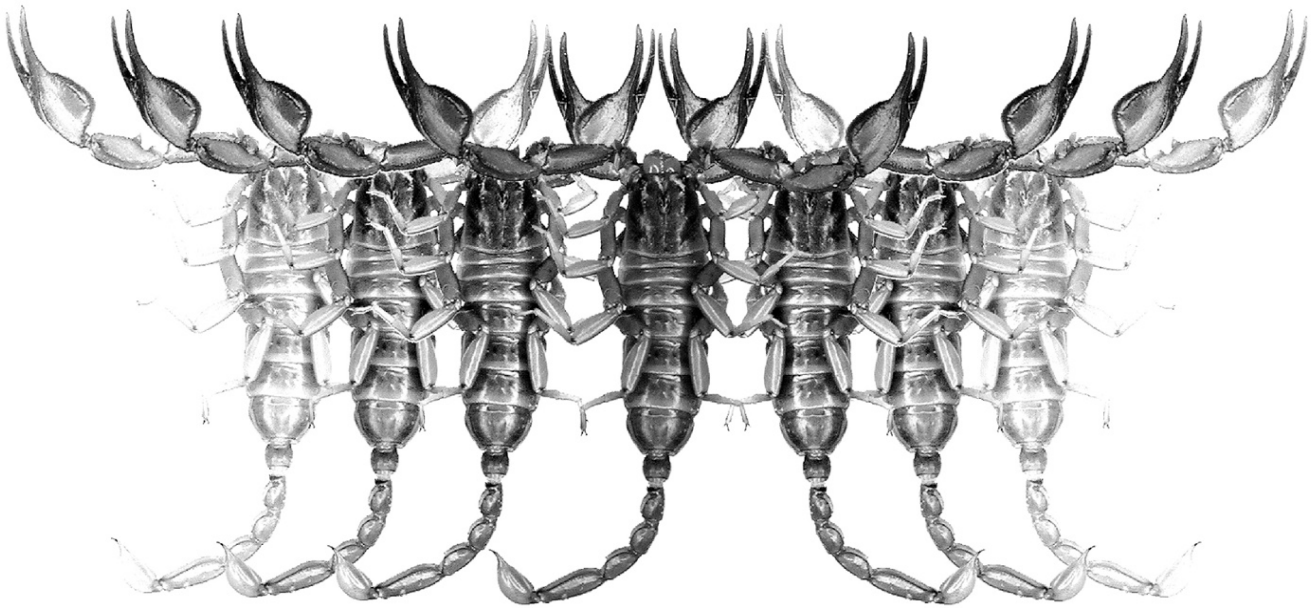


# ***Euscorpius***

**Occasional Publications in Scorpiology**



**Scorpions of the Horn of Africa  
(Arachnida, Scorpiones). Part XXXIV.  
Four new species of *Neobuthus* from  
Somaliland (Buthidae)**

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

**December 2024 — No. 401**

# *Euscorpius*

## *Occasional Publications in Scorpiology*

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Publication date: 16 December 2024

<http://zoobank.org/urn:lsid:zoobank.org:pub:7A1007F6-0FDB-40D3-A2B0-AF3D40CFCF5C>

# Scorpions of the Horn of Africa (Arachnida, Scorpiones). Part XXXIV. Four new species of *Neobuthus* from Somaliland (Buthidae)

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<http://zoobank.org/urn:lsid:zoobank.org:pub:7A1007F6-0FDB-40D3-A2B0-AF3D40CFCF5C>

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## Summary

New information about taxonomy and distribution of the genus *Neobuthus* Hirst, 1911 is presented, based on material recently collected in Somaliland. Four new species are described, *N. dhobo* sp. n., *N. opatovae* sp. n., *N. osoli* sp. n., and *N. verae* sp. n. (Somaliland). An updated distribution map of the genus *Neobuthus* is provided.

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## Introduction

The buthid genus *Neobuthus* includes small scorpion species from northeastern Africa (Horn of Africa), which were revised by Kovařík et al. (2018). Other three species were described in 2019 and 2023 (Kovařík, 2019; Kovařík et al., 2023). At this time, we are finalizing the paper about DNA phylogeny of the genus *Neobuthus*, which confirmed validity of other four new species described here. The occurrence of already known species at other localities is also reported. The new records are added to the updated map of distribution of the genus *Neobuthus*.

## Methods, Material & Abbreviations

Nomenclature and measurements follow Stahnke (1971), Sissom et al. (1990), Kovařík (2009), and Kovařík & Ojanguren Affilastro (2013), except for trichobothriotaxy (Vachon, 1974, 1975), and morphology of sternum (Soleglad & Fet, 2003).

Specimens used for this study were collected and imported with permissions from Amoud University and Ministry of the Environment of the Republic of Somaliland.

Specimens studied herein are preserved in 80% ethanol in the author's collection (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).

## Systematics

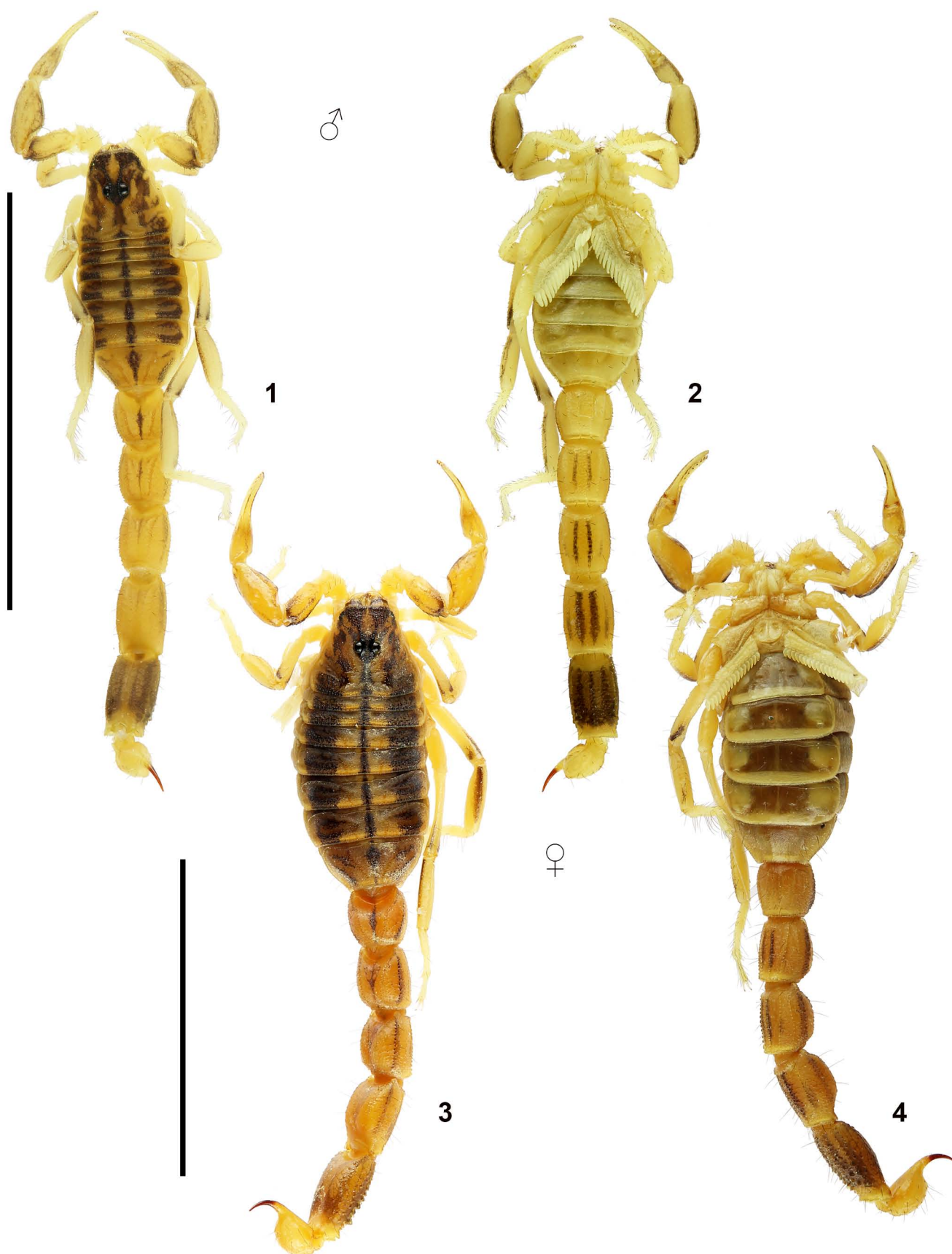
### Buthidae C. L. Koch, 1837

#### *Neobuthus* Hirst, 1911

(Figures 1–160, Tables 1–2)

*Neobuthus* Hirst, 1911: 462; Kovařík & Lowe, 2012: 1–25, figs. 1–6, 9–74, 86, 89, 92, 95–96, 100–101 (including complete generic synonymy prior to 2012); Kovařík et al., 2013: 4, 14; Lowe & Kovařík, 2016: 1–46, figs. 1–165, tables 1–5; Kovařík et al., 2018: 1–82, figs. 1–438, tables 1–5; Kovařík, 2019: 1–16, figs 1–70, table 1; Kovařík et al., 2023: 59–69, figs. 1–45, tab. 1.

**DIAGNOSIS.** Small buthid scorpions, total length 15–25 mm (males), 22–32 mm (females); carapace strongly trapezoidal, surface granular with only anterior median carinae developed; ventral aspect of cheliceral fixed finger with single denticle; tergites with three carinae, of which the lateral pair may be less conspicuous; sternites III–VI with finely micro-denticulate posterior margins, lacking larger non-contiguous denticles; pectines with fulcra, hirsute; metasomal segments I–III with 8–10 carinae, segment V with enlarged lobate dentition on posterior ventrolateral carinae; telson rather bulbous, vesicle steeply inclined posteriorly, aculeus shorter than vesicle; macrosetae on vesicle normal to surface (♂) or oriented in anterior direction (♀); pedipalps short with stout segments, movable finger of pedipalp with 4–6 subrows of primary



**Figures 1–4:** *Neobuthus dhobo* sp. n. **Figures 1–2.** Male holotype, dorsal (1) and ventral (2) views. **Figures 3–4.** Female paratype, dorsal (3) and ventral (4) views. Scale bars: 10 mm.

denticles flanked by mid-row internal and proximal external accessory denticles, 3 denticles just proximal to terminal denticle; movable finger without dense terminal brush of setae on ventral surface; strongly spatulate microsetae not present on termini of fixed and movable fingers; pedipalp finger margins straight, without proximal scalloping or basal lobe and notch; trichobothrial pattern type A, orthobothriotaxic or neobothriotaxic minorante, dorsal trichobothria of femur arranged in  $\beta$ -configuration; trichobothrium  $d_2$  of pedipalp femur present or absent on dorsal surface,  $d_2$  of pedipalp patella present or absent,  $d_3$  of pedipalp patella situated internal to dorsomedian carina,  $V_2$  of chela manus strongly displaced internally relative to  $V_1$ , chela fixed finger with  $db$  located in proximal half, proximal to  $est$ ; tibial spurs present on legs III–IV; sexual dimorphism in setation, granulation and metasomal dentition: pedipalps, legs and metasoma with weaker granulation and long, filiform macrosetae in females, stronger granulation and shorter (often spiniform) macrosetae in males, ventrosubmedian and ventrolateral carinae on segments II–III strongly developed with enlarged dentition in females and regular dentition in males; capsule of hemispermatophore with 4 lobes in typical 3+1 configuration, basal lobe a broad, robust, hook-like process, flagellum well separated from lobes.

SUBORDINATE TAXA. *Neobuthus amoudensis* Kovařík et al., 2018 (Somaliland, Ethiopia), *N. awashensis* Kovařík & Lowe, 2012 (Ethiopia, Somaliland), *N. berberensis* Hirst, 1911 (Somaliland, type species), *N. cloudsleythompsoni* Lourenço, 2001 (Ethiopia), *N. dhobo* sp. n. (Somaliland), *N. erigavoensis* Kovařík et al., 2018 (Somaliland), *N. eritreaensis* Lowe & Kovařík, 2016 (Eritrea), *N. factorio* Kovařík et al., 2018 (Somaliland), *N. ferrugineus* (Kraepelin, 1898) (Djibouti), *N. fryntai* Kovařík et al., 2023 (Somaliland), *N. gubanensis* Kovařík et al., 2018 (Somaliland), *N. haeckeli* Kovařík, 2019 (Somaliland), *N. kloppersi* Kovařík et al., 2018 (Kenya), *N. kutcheri* Lowe & Kovařík, 2016 (Ethiopia), *N. maidensis* Kovařík et al., 2018 (Somaliland), *N. montanus* Kovařík et al., 2018 (Somaliland), *N. opatovae* sp. n. (Somaliland), *N. osoli* sp. n. (Somaliland), *N. solegladi* Kovařík, 2019 (Somaliland), and *N. sudanensis* Lourenço, 2005 (Sudan, taxonomic position unclear), *N. verae* sp. n. (Somaliland).

***Neobuthus dhobo* sp. n.**

(Figs. 1–45, 160, Table 1)

<http://zoobank.org/urn:lsid:zoobank.org:act:FFCC6091-2691-4C3D-8F54-34925A726F31>

TYPE LOCALITY AND TYPE REPOSITORY. **Somaliland**, Awdal Region, Fadhixun, 10.2915050°N 43.2847133°E, FKCP.

TYPE MATERIAL EXAMINED. **Somaliland**, Awdal Region, Fadhixun, 10.2915050°N 43.2847133°E, 1♀ (holotype DNA No. 498) 2♀1juv. ♀ (paratypes DNA Nos. 499, 514, 515), Carawayne, 10.2842511°N 43.4213997°E, 1♂ (paratype DNA No. 519), XI.2023, leg. Hassan Elmi.

ETYMOLOGY. Named after the mountain range in the area of distribution.

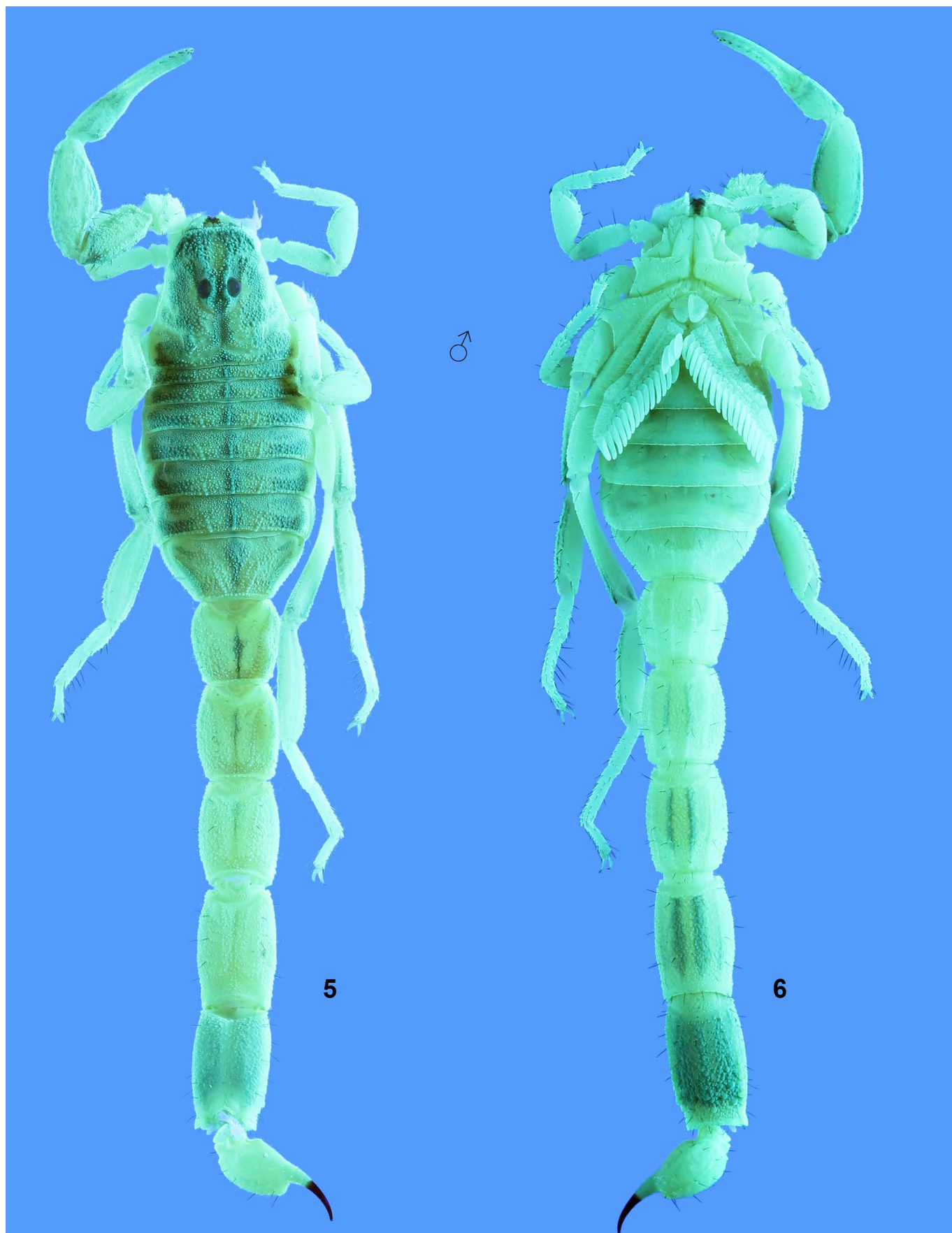
DIAGNOSIS (♂♀). Total length 16 mm (male), 22–25 mm (females); carapace with area between anterior median carinae fuscous; tergites with 3 dark stripes, median stripe flanked on either side by broad longitudinal yellow bands that may be broken by fuscosity extending across anterior tergites; pedipalp relatively slender, male with femur L/W 2.34, patella L/W 2.44, chela L/W 4.63; chela movable finger with 5–6 subrows of primary denticles, 4 external accessory denticles flanking proximal end of each subrow; dorsoexternal and ventroexternal carinae on pedipalp patella in female absent or weakly indicated; posterior margins of tergites without or with 1–2 pairs of macrosetae; pedipalps, legs, metasoma and telson with moderately short in male, not very spiniform, and long, fine setae in females; both sexes with sternites III–VI smooth, sternite VII finely granulated with 4 granulated carinae; sternite III with lesser than 10 macrosetae; metasoma I–III with median lateral carinae absent; lateral surface of metasoma V in males granulated, with granules separated; soles of telotarsi with relatively sparse setation, leg III of adults with 18–21 ventral macrosetae on telotarsus; pectine teeth: 17 (male), 14–17 (females).

DESCRIPTION. Total length of adult male 16 mm, of adult females 22–25 mm; measurements of carapace, telson, segments of metasoma and pedipalps given in Table 1; positions and distribution of trichobothria of pedipalps shown in Figs. 36–39, 41–42; trichobothrium  $d_2$  usually present on pedipalp femur and present on patella; base color yellow to light orange with variable fuscous pigmentation and extensive patterns of dark maculation on mesosoma, metasoma, partially on pedipalps and legs; chelicerae yellow with dark reticulation on anterior manus, dentition reddish. *Sexual dimorphism*: strong, adult male substantially smaller, but without differences in shapes of pedipalps, metasoma and telson; pedipalp patella and femur granulate and matte in males, smooth and glossy in females; macrosetae on pedipalps, legs, metasoma and telson much longer and finer in females than males; other sex differences cited below.

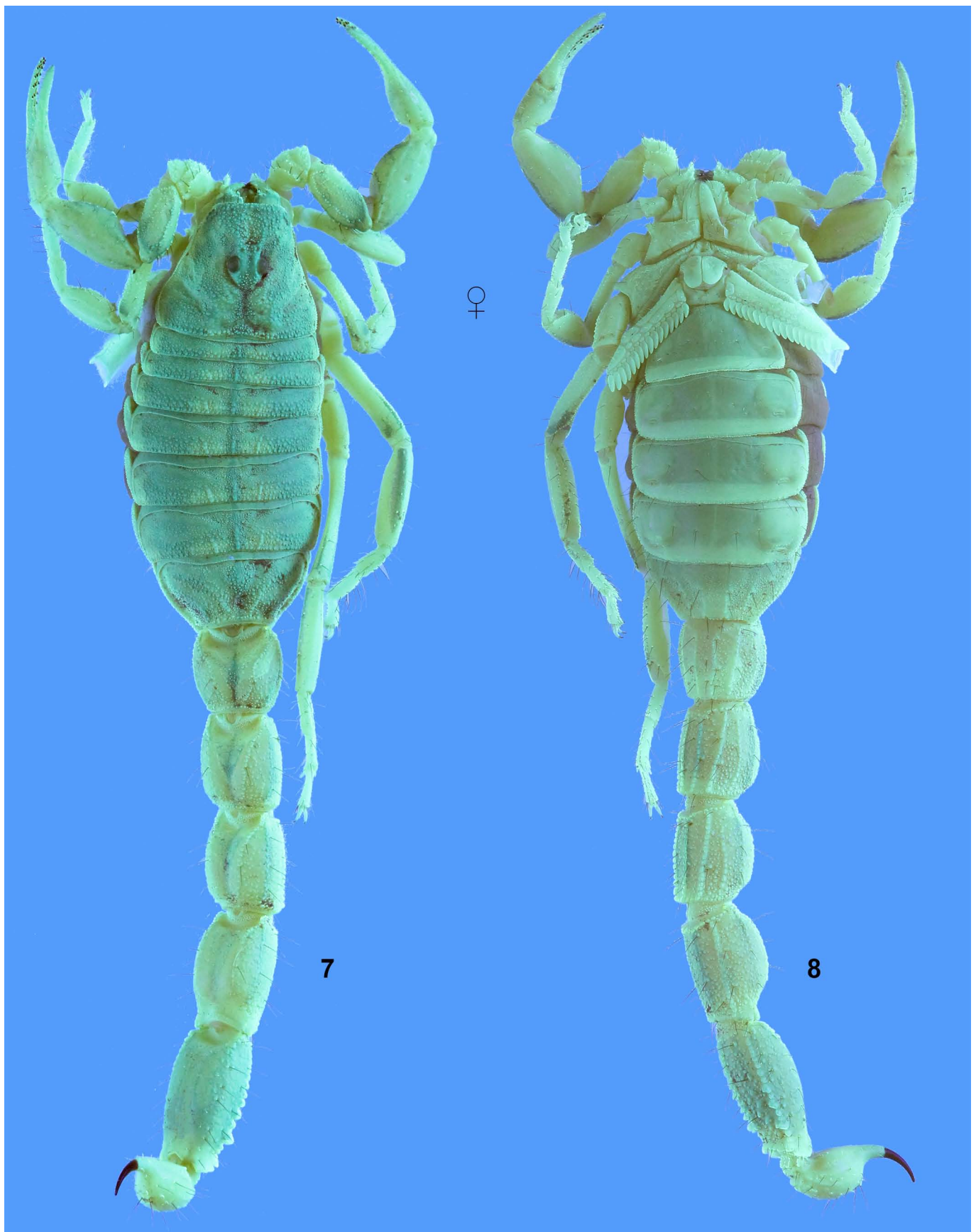
**Pedipalp** (Figs. 25–45). Pedipalp mostly sparsely hirsute; finely granulated in males and smooth in females; femur with five conspicuously granulose carinae, more strongly developed in male; patella with seven granulose carinae, well developed in male and reduced or absent in females; dorsoexternal carinae on pedipalp patella in female absent or weakly indicated; chela with smooth carinae in females absent or weakly indicated; chela movable finger with 5–6 and fixed finger with 5 subrows of primary denticles, 4 external accessory denticles flanking proximal end of each subrow.

**Carapace** (Figs. 5–9, 11). Strongly trapezoidal (narrower anteriorly), wider than long (L/ W 0.81–0.96); posterior median postocular area flat, anterior median preocular area gently sloped downwards towards anterior margin; lateral flanks steeply sloped; ocular tubercle broad, prominent,





Figures 5–6. *Neobuthus dhobo* sp. n., male holotype, dorsal (5) and ventral (6) views under UV fluorescence.



Figures 7–8. *Neobuthus dhobo* sp. n., female paratype, dorsal (7) and ventral (8) views under UV fluorescence.

Dimensions (mm)		<i>Neobuthus opatovae</i> sp. n.	<i>Neobuthus dhobo</i> sp. n.	<i>Neobuthus dhobo</i> sp. n.
		♂ holotype	♂ holotype	♀ paratype
Carapace	L / W	2.74 / 3.04	2.10 / 2.18	2.91 / 3.61
Mesosoma	L	5.33	3.65	6.00
Tergite VII	L / W	1.38 / 2.98	1.01 / 2.25	1.54 / 3.33
Metasoma + telson	L	14.17	10.37	14.32
Segment I	L / W / D	1.78 / 1.96 / 1.75	1.33 / 1.37 / 1.27	1.84 / 1.91 / 1.70
Segment II	L / W / D	2.04 / 1.83 / 1.68	1.49 / 1.25 / 1.17	2.04 / 1.71 / 1.64
Segment III	L / W / D	2.23 / 1.83 / 1.65	1.60 / 1.23 / 1.21	2.11 / 1.67 / 1.67
Segment IV	L / W / D	2.66 / 1.75 / 1.54	1.89 / 1.21 / 1.11	2.53 / 1.60 / 1.57
Segment V	L / W / D	3.02 / 1.70 / 1.33	2.15 / 1.11 / 0.98	3.07 / 1.62 / 1.36
Telson	L / W / D	2.44 / 1.09 / 0.98	1.91 / 0.78 / 0.72	2.73 / 1.15 / 1.08
Pedipalp	L	6.95	5.60	7.16
Femur	L / W	1.72 / 0.76	1.38 / 0.59	1.71 / 0.80
Patella	L / W	2.25 / 1.06	1.86 / 0.76	2.51 / 1.11
Chela	L	2.98	2.36	2.94
Manus	W / D	0.70 / 0.71	0.51 / 0.58	0.73 / 0.68
Movable finger	L	1.79	0.96	2.00
<b>Total</b>	<b>L</b>	<b>22.24</b>	<b>16.12</b>	<b>23.23</b>

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

located slightly anterior of carapace; anterior margin straight, finely microdenticulate, with coarser granules overlapping edge, bearing 8 macrosetae; anterior median carinae present, coarsely granular, other carinae indistinct; dense granulation covering most of carapace.

**Chelicera.** Fingers with typical buthid dentition (Vachon, 1963; Lowe & Kovařík, 2016; Kovařík et al., 2018); fixed finger with large distal denticle, 1 subdistal denticle and 2 basal denticles fused into bicus, single denticle on ventral surface at level of bicus; dorsal margin of movable finger with 5 denticles: 1 large distal denticle, medium-sized subdistal and medial, and 2 small, partially fused basal denticles; ventral margin with 2 denticles.

**Mesosoma** (Figs. 5–12). Tergites I–VI bear three carinae of which the lateral pair may be less conspicuous mainly on tergites I–IV; tergite VII bears five well-defined carinae (median, submedians and laterals); tergites I–VI densely granular, with coarser granules on posterior lateral areas; tergite VII densely granular; sternites III–VI smooth in both sexes; sternite VII granulated in both sexes, with four well-defined carinae; sternite III with lesser than 10 macrosetae; sternum type 1, triangular in shape, smooth, with deep posteromedian invagination; genital opercula smooth; genital papillae present; pectines extending to around half of sternite V in male and around half of sternite IV in females; pectine teeth 17 in male, 14–17 in females; combs with 3 marginal lamellae and 7–8 middle lamellae; marginal lamellae, middle lamellae and fulcra with dense cover of short dark reddish macrosetae; fulcra with 2–4 setae.

**Legs** (Figs. 13–16). Coxa, femora, patella and tibia of all legs bearing variable numbers of short to medium length, straight, dark-reddish macrosetae; tarsi with mix of short and longer,

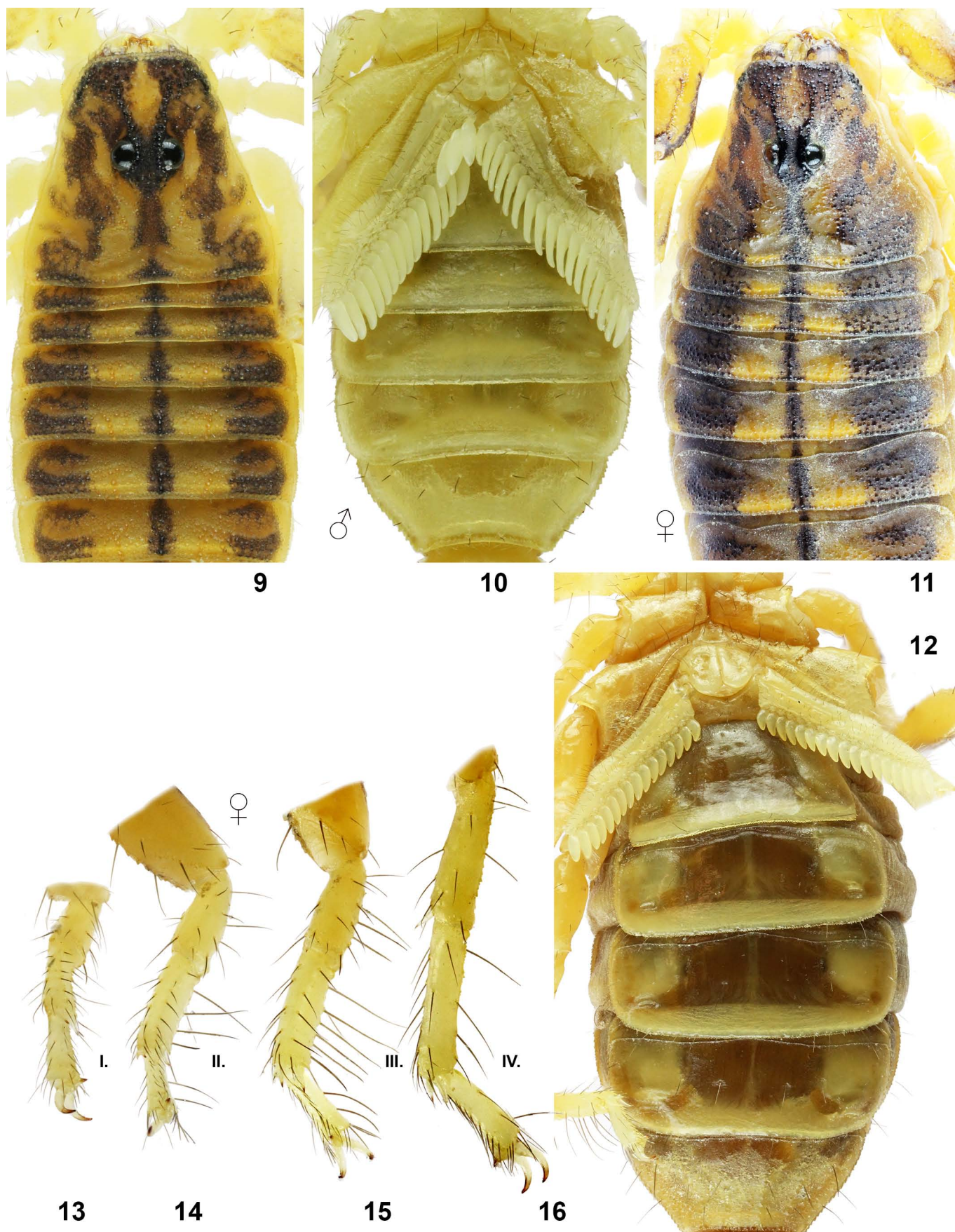
dark-reddish macrosetae; basitarsi I–III slightly compressed with flat retrolateral surfaces, with bristle combs consisting of retrosuperior series of longer macrosetae, plus retroinferior and proinferior series of shorter macrosetae; telotarsi with two rows of short macrosetae on ventral aspect, 18–21 macrosetae on telotarsus III; strong tibial spurs present on leg IV and reduced on leg. III.

**Metasoma and telson** (Figs. 5–8, 17–24). Metasoma and telson sparsely hirsute, macrosetae moderately short, not very spiniform, and long in male, and long, fine setae in females; metasomal segments I–IV with 8 carinae, V with 2 carinae; all carinae relatively well developed; segment V with strong, granulate to dentate-lobate ventrolateral carinae; segments I–V with dense granulation on all intercarinal surfaces except dorsal surfaces which are sparsely granulated in female; segment V densely granular on lateral and ventral surfaces, more coarsely so on ventral surface; telson smooth, ventral surface sparsely, weakly granular; vesicle slightly elongated; aculeus stout, shorter than vesicle, tip of aculeus almost vertically directed.

**Measurements.** See Table 1.

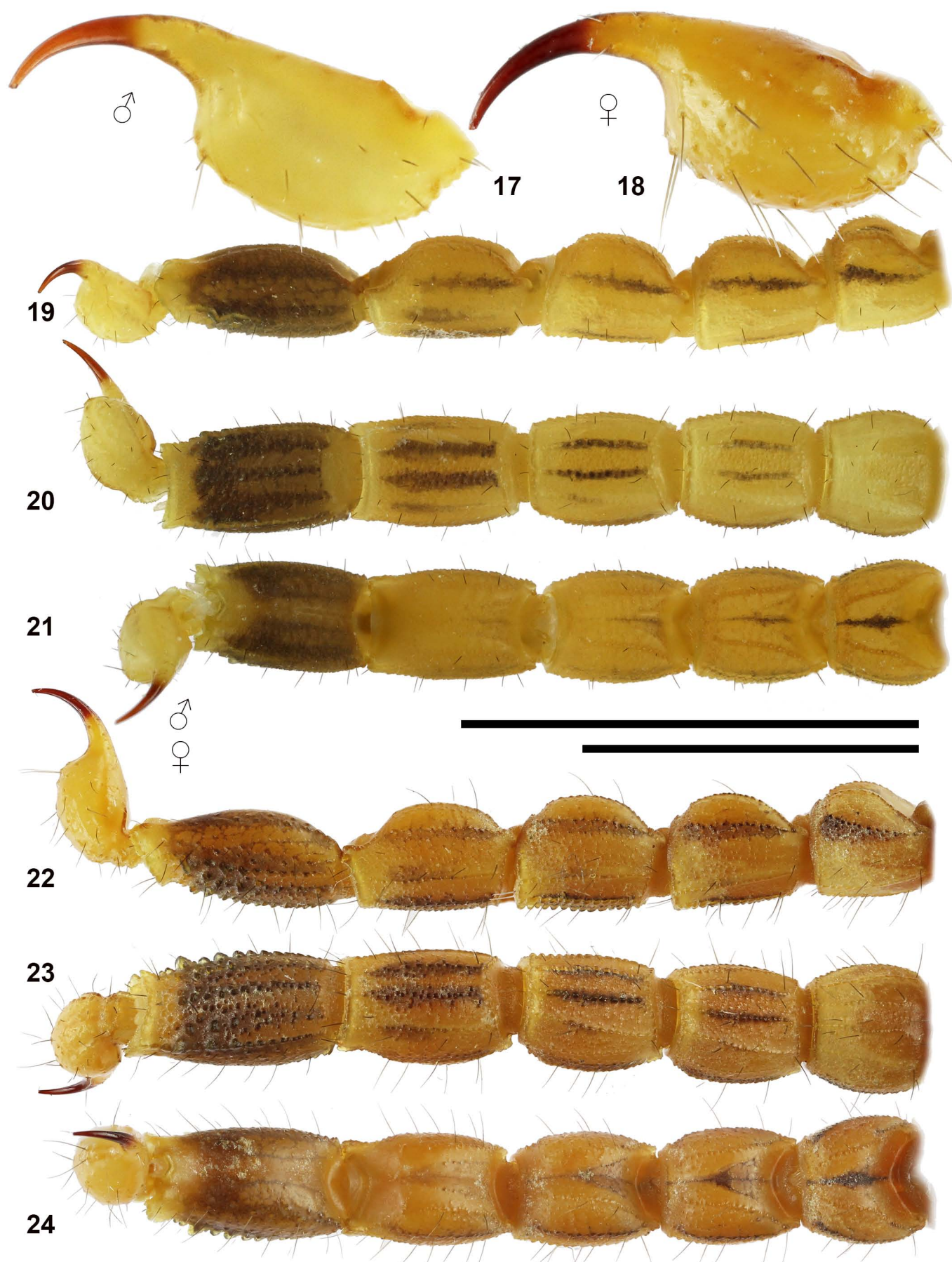
**AFFINITIES.** The described features distinguish *N. dhobo* sp. n. from all other species of the genus. They are recounted in the key below and confirmed by DNA phylogeny (paper in preparation). The new species is most similar to *N. amoudensis*, which distinguishes mainly according to two important characters. Female metasoma I–III with dorsal carinae present in *N. amoudensis* versus absent in *N. dhobo* sp. n.; sternite III with ca 25 macrosetae (fig. 10 in Kovařík et al., 2018: 7) in *N. amoudensis* versus sternite III with lesser than 10 macrosetae (Fig. 8) in *N. dhobo* sp. n.





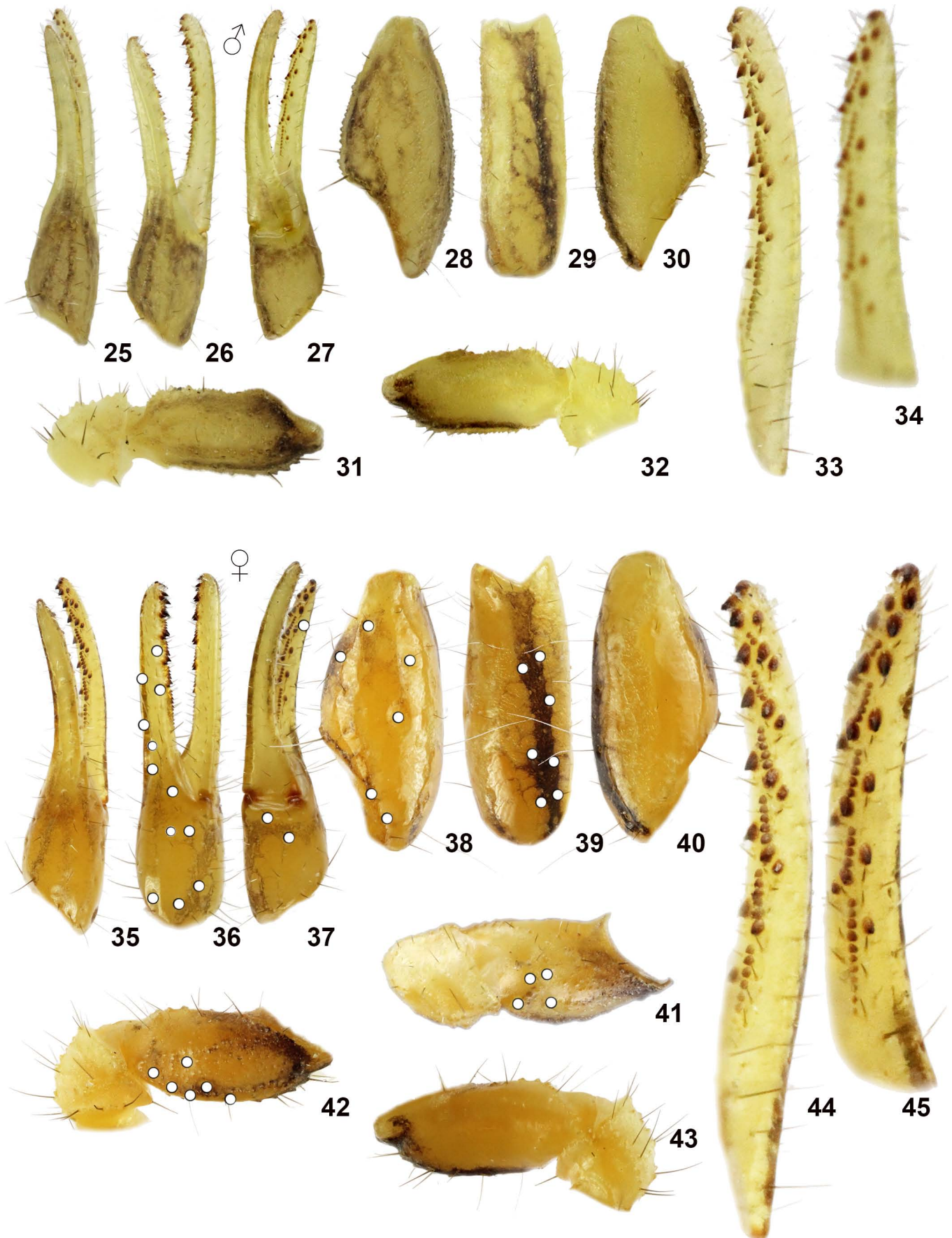
**Figures 9–16:** *Neobuthus dhobo* sp. n. **Figures 9–10:** Male holotype, carapace and tergites I–VI (9), coxosternal area and sternites (10). **Figures 11–16:** Female paratype, carapace and tergites I–V (11), coxosternal area and sternites (12), and right legs I–IV, retrolateral aspect (13–16).





**Figures 17–24:** *Neobuthus dhobo* sp. n. **Figures. 17, 19–21.** Male holotype, telson lateral (17), metasoma and telson lateral (19), ventral (20), and dorsal (21) views. **Figures. 18, 22–24.** Female paratype, telson lateral (18), metasoma and telson lateral (22), ventral (23), and dorsal (24) views. Scale bars: 5 mm (19–21, 22–24).





**Figures 25–45:** *Neobuthus dhobo* sp. n., pedipalp. **Figures 25–34:** Male holotype, chela dorsal (25), external (26), and ventral (27) views, patella dorsal (28), external (29) and ventral (30) views, femur and trochanter dorsal (31), and ventral (32) views, movable (33) and fixed (34) finger dentate margin. **Figures 35–45:** Female paratype, chela dorsal (35), external (36), and ventral (37) views, patella dorsal (38), external (39) and ventral (40) views, femur and trochanter internal (41), dorsal (42) and ventral (43) views, movable (44) and fixed (45) finger dentate margin. The trichobothrial pattern is indicated in Figures 36–39, 41–42 (white circles).

***Neobuthus opatovae* sp. n.**

(Figs. 46–75, 160, Table 1)

<http://zoobank.org/urn:lsid:zoobank.org:act:AEC79ADE-042E-4903-BC6C-8CE42EC4B63E>

TYPE LOCALITY AND TYPE REPOSITORY. **Somaliland**, Maroodi Jeex Region, Habaaswayn, 9.3841900°N 44.0526747°E, FKCP.

TYPE MATERIAL EXAMINED. **Somaliland**, Maroodi Jeex Region, Habaaswayn, 9.3841900°N 44.0526747°E, XI.2023, 2♂ (holotype DNA No. 947 and paratype DNA No. 948), leg. Hassan Elmi.

ETYMOLOGY. It is a pleasure to name this species after Vera Opatova, the Czech arachnologist. Her phylogenetic analyses highly contribute to the understanding of species diversity and phylogeny across various arachnid groups, including scorpions. The name of this species is derived from her last name, Opatova.

DIAGNOSIS (♂). Total length of male 22 mm, female unknown; carapace with area between anterior median carinae fuscous; tergites with 3 dark stripes, median stripe flanked on either side by broad longitudinal yellow bands that may be broken by fuscosity extending across anterior tergites; pedipalp relatively slender, male with femur L/W 2.26, patella L/W 2.12, chela L/W 4.26; chela movable finger with 6 subrows of primary denticles, 5 external accessory denticles flanking proximal end of each subrow; dorsoexternal and ventroexternal carinae on pedipalp patella in male present; posterior margins of tergites with 2–3 pairs of macrosetae; pedipalps, legs, metasoma and telson with moderately short in male, not very spiniform, and long, fine setae in females; male with sternites III–VI granulated locally, sternite VII densely granulated with 4 granulated carinae; sternite III with 10 macrosetae; metasoma I–III with median lateral carinae present; lateral surface of metasoma V in males granulated, with granules separated; soles of telotarsi with relatively sparse setation, leg III of adults with 18–21 ventral macrosetae on telotarsus; pectine teeth: 19–20 in males.

DESCRIPTION. Total length of adult males 22 mm, female unknown; measurements of carapace, telson, segments of metasoma and pedipalps given in Table 1; positions and distribution of trichobothria of pedipalps shown in Figs. 63–67, 69–70; trichobothrium  $d_2$  present on pedipalp femur and patella; base color yellow to light orange with variable fuscous pigmentation and extensive patterns of dark maculation on mesosoma, metasoma, partially on pedipalps and legs; chelicerae yellow with dark reticulation on anterior manus, dentition reddish. *Sexual dimorphism* unknown.

**Pedipalp** (Figs. 63–75). Pedipalp mostly sparsely hirsute; finely granulated in males; femur with five conspicuously granulose carinae developed in male; patella with seven granulose carinae, well developed; chela movable finger with

6 subrows of primary denticles, 5 external accessory denticles flanking proximal end of each subrow.

**Carapace** (Figs. 48, 50). Strongly trapezoidal (narrower anteriorly), wider than long (L/ W 0.90); posterior median postocular area flat, anterior median preocular area gently sloped downwards towards anterior margin; lateral flanks steeply sloped; ocular tubercle broad, prominent, located slightly anterior of carapace; anterior margin straight, finely microdenticulate, with coarser granules overlapping edge, bearing 6 macrosetae; anterior median carinae present, coarsely granular, other carinae indistinct; dense granulation covering most of carapace.

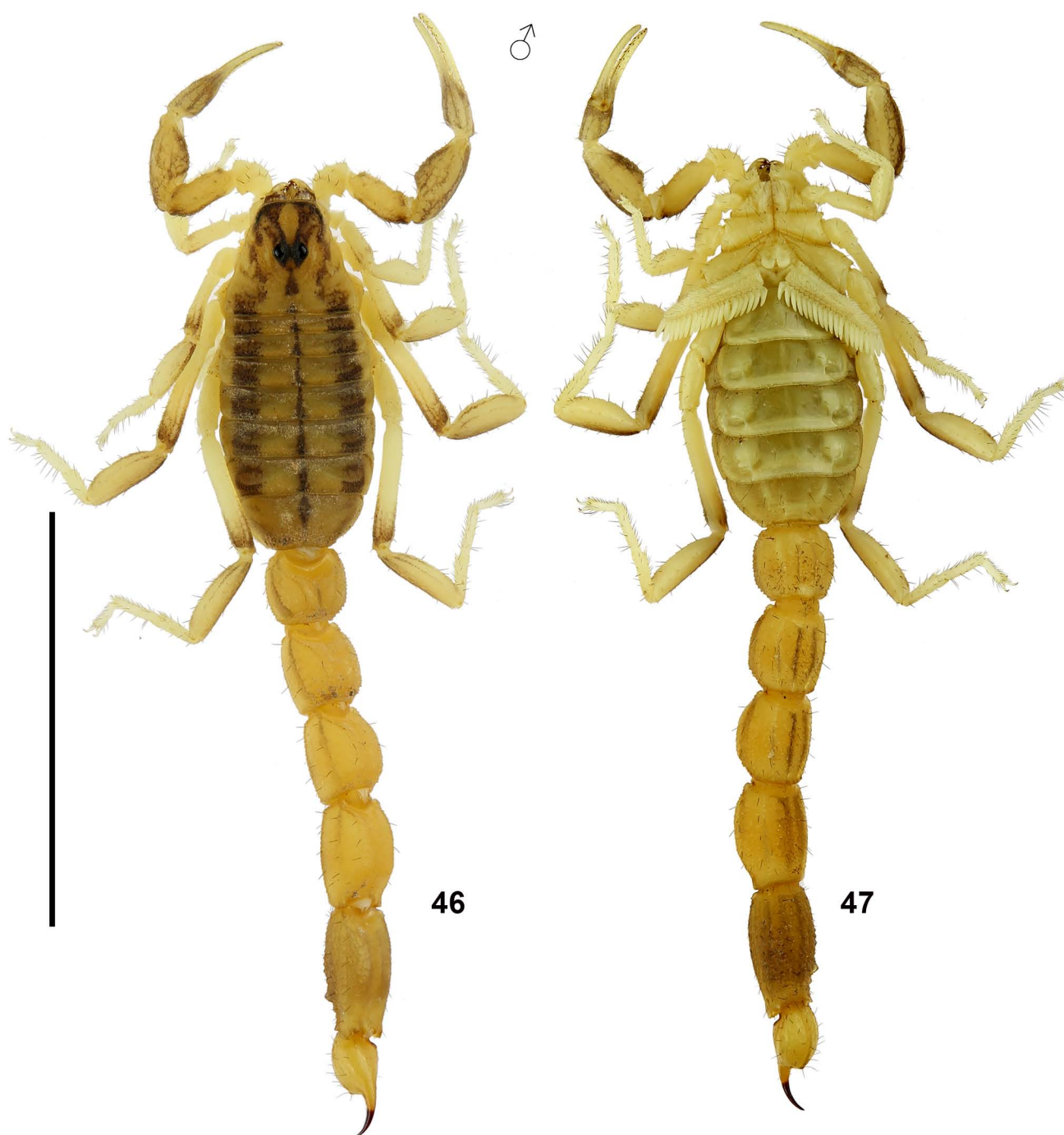
**Chelicera**. Fingers with typical buthid dentition (Vachon, 1963; Lowe & Kovařík, 2016; Kovařík et al., 2018); fixed finger with large distal denticle, 1 subdistal denticle and 2 basal denticles fused into bicus, single denticle on ventral surface at level of bicus; dorsal margin of movable finger with 5 denticles: 1 large distal denticle, medium-sized subdistal and medial, and 2 small, partially fused basal denticles; ventral margin with 2 denticles.

**Mesosoma** (Figs. 48–51). Tergites I–VI bear three carinae of which the lateral pair may be less conspicuous mainly on tergites I–IV; tergite VII bears five indicated carinae; tergites densely granular, with coarser granules on posterior lateral areas; tergite; sternites III–VI granulated locally, posterior margins of tergites with 2–3 pairs of macrosetae; sternite VII densely granulated with 4 granulated carinae; sternite III with 10 macrosetae; sternum type 1, triangular in shape, smooth, with deep posteromedian invagination; genital opercula smooth; genital papillae present; pectines extending to around end of sternite IV in males; pectine teeth 19–20 in males; combs with 3 marginal lamellae and 6 middle lamellae; marginal lamellae, middle lamellae and fulcra with dense cover of short dark reddish macrosetae; fulcra with 2–4 setae.

**Legs** (Figs. 52–55). Coxa, femora, patella and tibia of all legs bearing variable numbers of short to medium length, straight, dark-reddish macrosetae; tarsi with mix of short and longer, dark-reddish macrosetae; basitarsi I–III slightly compressed with flat retrolateral surfaces, with bristle combs consisting of retrosuperior series of longer macrosetae, plus retroinferior and proinferior series of shorter macrosetae; telotarsi with two rows of short macrosetae on ventral aspect, 18–21 macrosetae on telotarsus III; strong tibial spurs present on leg IV and reduced on leg. III.

**Metasoma and telson** (Figs. 56–62). Metasoma and telson sparsely hirsute, macrosetae moderately short, not very spiniform, and long in male; metasomal segments I–III with 10 carinae, IV with 8 carinae, V with 2 carinae; all carinae relatively well developed; segment V with strong, granulate to dentate-lobate ventrolateral carinae; segments I–IV with dense granulation on all intercarinal surfaces; segment V densely granular on lateral and ventral surfaces, more coarsely so on ventral surface; telson smooth, ventral surface sparsely, weakly granular; vesicle slightly elongated; aculeus stout, shorter than vesicle, tip of aculeus almost vertically directed.

**Measurements**. See Table 1.

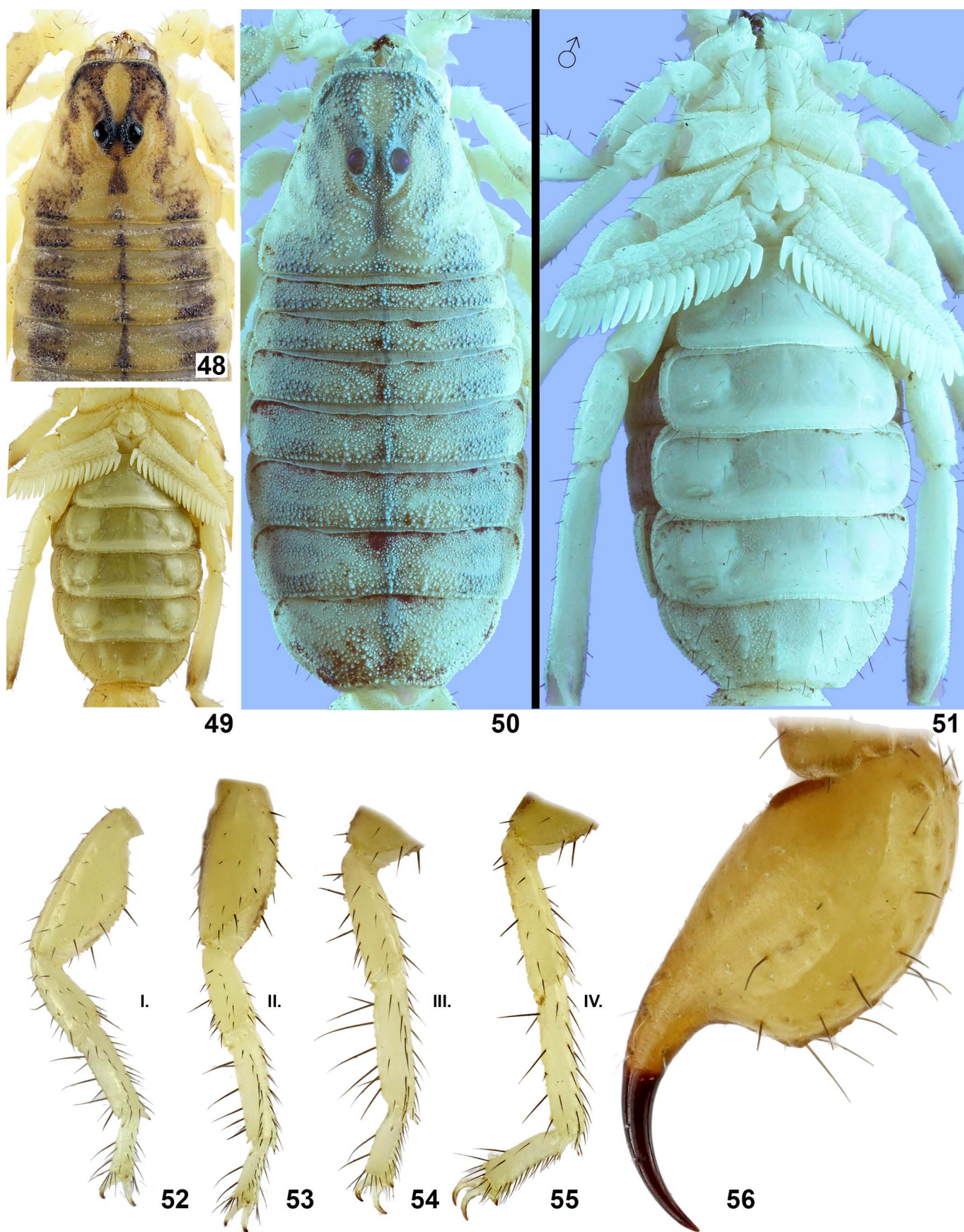


Figures 46–47: *Neobuthus opatovae* sp. n., male holotype, dorsal (46) and ventral (47) views. Scale bar: 10 mm.

**AFFINITIES.** The described features distinguish *N. opatovae* sp. n. from all other species of the genus. They are confirmed by DNA phylogeny (paper in preparation) but we did not include it in the key below because the female is unknown. The new species is most similar according to DNA analysis to *N. amoudensis*, which has pedipalp chela movable finger with 6 subrows (*N. opatovae* sp. n. has movable finger with 5 subrows of primary denticles). Type locality of *N. opatovae* sp.

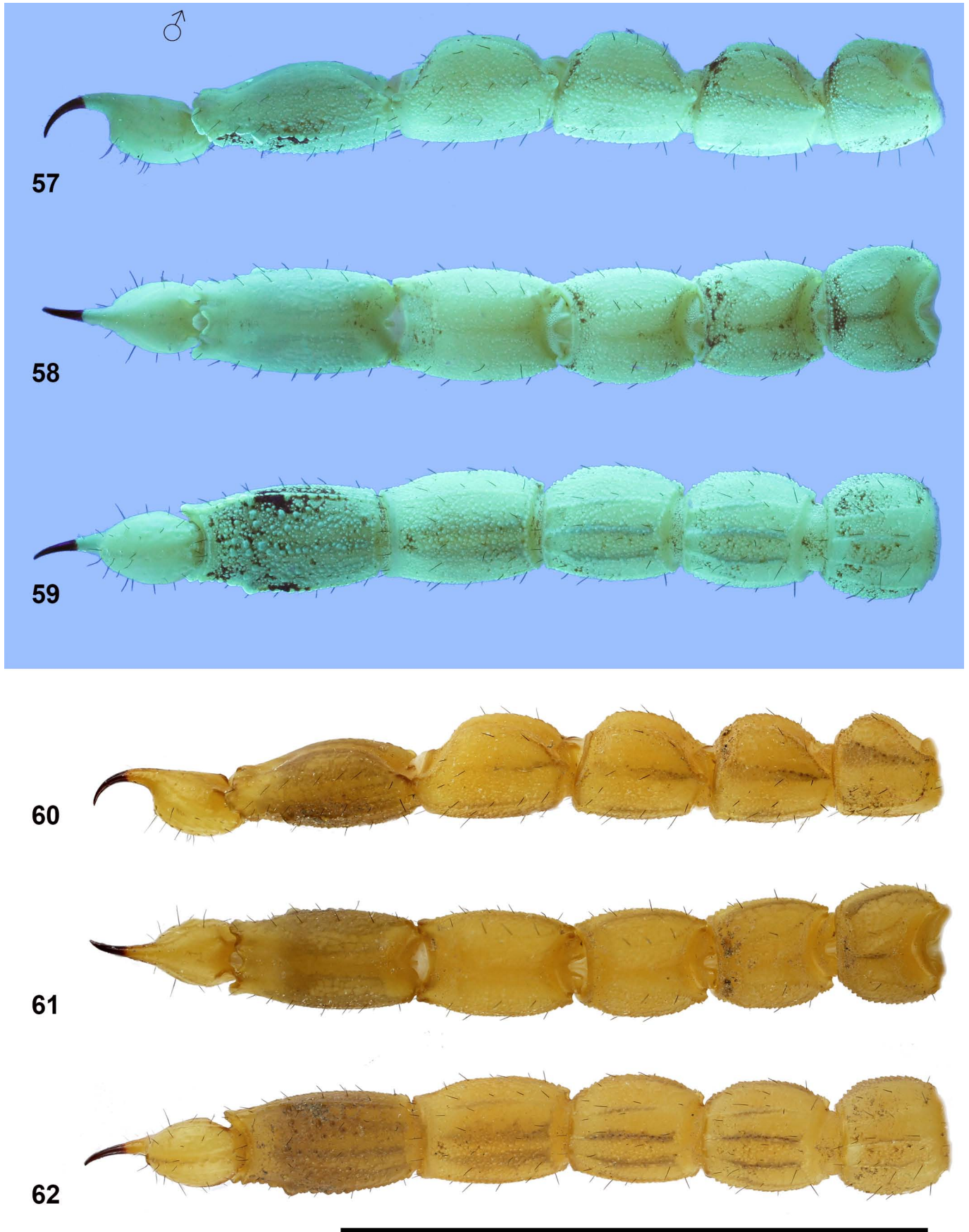
n. is relatively near to localities of *N. factorio* and *N. solegladi* (see Fig. 160). *N. factorio* has pedipalp chela movable finger with 6 subrows of primary denticles and 5 external accessory denticles versus 5 subrows of primary denticles and 4 external accessory denticles in *N. opatovae* sp. n. *N. solegladi* has leg III of adults with 9–13 ventral macrosetae on telotarsus (*N. opatovae* sp. n. has leg III of adults with 18–21 ventral macrosetae on telotarsus).



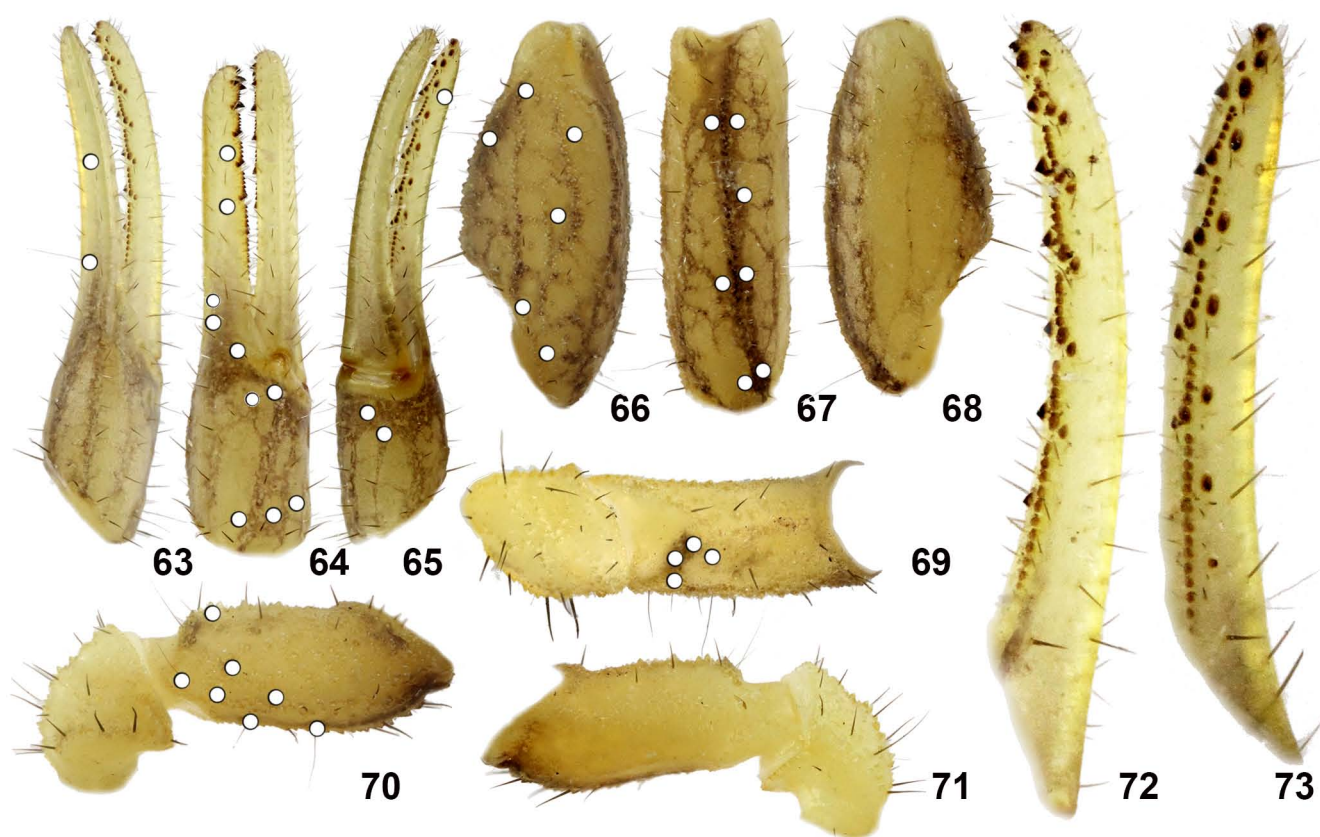


**Figures 48–56:** *Neobuthus opatovae* sp. n., male holotype. **Figures 48–49:** Carapace and tergites I–IV (48) and coxosternal area and sternites (49). **Figures 50–51:** Carapace and tergites (50) and coxosternal area and sternites (51) under UV fluorescence. **Figures 52–55:** Left legs I–IV, retrolateral aspect. **Figure 56:** Telson lateral view.





**Figures 57–62.** *Neobuthus opatovae* sp. n., male holotype, metasoma and telson lateral (57, 60), dorsal (58, 61), and ventral (59, 62) views, under UV fluorescence (57–59) and under white light (60–62). Scale bar: 5 mm.



**Figures 63–75:** *Neobuthus opatovae* sp. n., pedipalp, male holotype. **Figures 63–73:** Chela dorsal (63), external (64), and ventral (65) views, patella dorsal (66), external (67) and ventral (68) views, femur and trochanter internal (69), dorsal (70), and ventral (71) views, movable (72) and fixed (73) finger dentate margin. The trichobothrial pattern is indicated in Figures 63–67, 69–70 (white circles). **Figures 74–75:** Right pedipalp in dorsal (74) and ventral (75) views under UV fluorescence.

*Neobuthus osoli* sp. n.

(Figs. 76–121, 160, Table 2)

<http://zoobank.org/urn:lsid:zoobank.org:act:8B3EAA91-F739-4C7A-A292-E286953AAEBD>

TYPE LOCALITY AND TYPE DEPOSITORY. **Somaliland**, Awdal Region, Osoli, 10.4372736°N 43.7051653°E, FKCP.

TYPE MATERIAL EXAMINED. **Somaliland**, Awdal Region, Osoli, 10.4372736°N 43.7051653°E, XI.2023, 1♂ (holotype, DNA No. 792) 1♀ (paratype, DNA No. 794), leg. Hassan Elmi.

ETYMOLOGY. Named after the type locality, near Osoli town.

DIAGNOSIS (♂♀). Total length 19 mm (male), 25 mm (female); carapace with area between anterior median carinae orange to partially fuscous; tergites with 3 dark stripes, median stripe flanked on either side by broad longitudinal yellow bands that may be broken by fuscosity extending across anterior tergites; pedipalp, male with femur L/W 1.95, patella L/W 2.55, chela L/W 4.50; chela movable finger with 5–6 subrows of primary denticles, 4 external accessory denticles flanking proximal end of each subrow; dorsoexternal carina on pedipalp patella in female weakly indicated, ventroexternal carina absent; posterior margins of tergites without or with 1–2 pairs of macrosetae; pedipalps, legs, metasoma and telson with very short, stout macrosetae in male, and long, fine setae in female; male with sternite VII densely granular with 4 vestigial median carinae; female with sternites III–VI smooth, sternite VII finely granular with 4 carinae; metasoma I–III with median lateral carinae absent in both sexes; lateral surfaces of metasoma I–IV densely granulated in both sexes; lateral surface of metasoma V in males densely granulated, with granules separated; tarsi with relatively sparse setation, leg III of adults with 12–14 ventral macrosetae on telotarsus; pectine teeth: 16 in male, 14 in female.

DESCRIPTION. Total length of adult male 19 mm, of adult females 25 mm; measurements of carapace, telson, segments of metasoma and pedipalps given in Table 1; positions and distribution of trichobothria of pedipalps shown in Figs. 112–115, 117–118; trichobothrium  $d_2$  present on pedipalp femur and patella; base color yellow to light orange with variable fuscous pigmentation and extensive patterns of dark maculation on mesosoma, metasoma, partially on pedipalps and legs; chelicerae yellow with dark reticulation on anterior manus, dentition reddish. *Sexual dimorphism*: strong, adult male substantially smaller, but without differences in shapes of pedipalps, metasoma and telson; pedipalp patella and femur granulate and matte in males, smooth and glossy in females; macrosetae on pedipalps, legs, metasoma and telson much longer and finer in females than males; other sex differences cited below.

**Pedipalp** (Figs. 100–121). Pedipalp mostly sparsely hirsute; finely granulated in males and smooth in females; femur with five conspicuously granulose carinae, more strongly

developed in male; patella with seven granulose carinae, well developed in male and reduced or absent in females; dorsoexternal carinae on pedipalp patella in female weakly indicated; chela with carinae present but smooth in females; chela movable finger with 5–6 and fixed finger with 5 subrows of primary denticles, 3 (fixed finger) or 4 (movable finger) external accessory denticles flanking proximal end of each subrow.

**Carapace** (Figs. 84, 86). Strongly trapezoidal (narrower anteriorly), wider than long (L/ W 0.89–0.96); posterior median postocular area flat, anterior median preocular area gently sloped downwards towards anterior margin; lateral flanks steeply sloped; ocular tubercle broad, prominent, located slightly anterior of carapace; anterior margin straight, finely microdenticulate, with coarser granules overlapping edge, bearing 8 macrosetae; anterior median carinae present, coarsely granular, other carinae indistinct; dense granulation covering most of carapace.

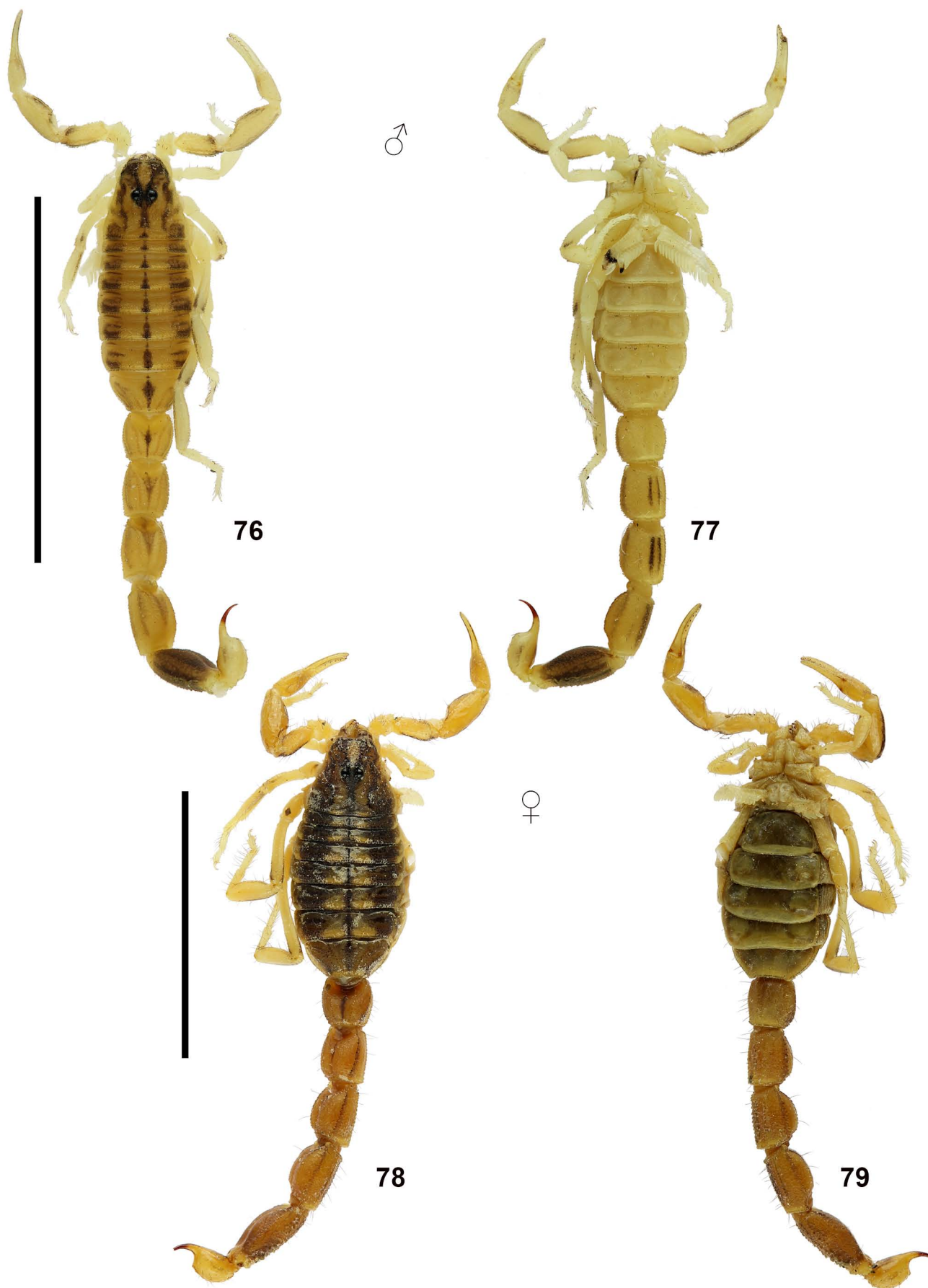
**Chelicera**. Fingers with typical buthid dentition (Vachon, 1963; Lowe & Kovařík, 2016; Kovařík et al., 2018); fixed finger with large distal denticle, 1 subdistal denticle and 2 basal denticles fused into bicus, single denticle on ventral surface at level of bicus; dorsal margin of movable finger with 5 denticles: 1 large distal denticle, medium-sized subdistal and medial, and 2 small, partially fused basal denticles; ventral margin with 2 denticles.

**Mesosoma** (Figs. 82–87). Tergites I–VI bear three carinae of which the lateral pair may be less conspicuous mainly on tergites I–IV; tergite VII bears five well-defined carinae (median, submedians and laterals); tergites I–VI densely granular, with coarser granules on posterior lateral areas; tergite VII densely granular; sternites III–VI smooth in female, and finely granulated in male; sternite VII granulated in both sexes, more so in males, with four well-defined carinae; sternum type 1, triangular in shape, smooth, with deep posteromedian invagination; genital opercula smooth; genital papillae present; pectines extending to around end of sternite IV in male and around end of sternite III in female; pectine teeth 16 in male, 14 in female; combs with 3 marginal lamellae and 7–8 middle lamellae; marginal lamellae, middle lamellae and fulcra with dense cover of short dark reddish macrosetae; fulcra with 2–4 setae.

**Legs** (Figs. 88–91). Coxa, femora, patella and tibia of all legs bearing variable numbers of short to medium length, straight, dark-reddish macrosetae; tarsi with mix of short and longer, dark-reddish macrosetae; basitarsi I–III slightly compressed with flat retrolateral surfaces, with bristle combs consisting of retrosuperior series of longer macrosetae, plus retroinferior and proinferior series of shorter macrosetae; telotarsi with two rows of short macrosetae on ventral aspect, 12–14 macrosetae on telotarsus III; moderate tibial spurs present on leg IV and reduced on leg. III.

**Metasoma and telson** (Figs. 92–99). Metasoma and telson sparsely hirsute, macrosetae very short, stout in male, and long, fine setae in female; metasomal segments I–IV with 8 carinae, V with 2 carinae; all carinae relatively well





**Figures 76–79:** *Neobuthus osoli* sp. n. **Figures 76–77.** Male holotype, dorsal (76) and ventral (77) views. **Figures 78–79.** Female paratype, dorsal (78) and ventral (79) views. Scale bars: 10 mm.



Dimensions (mm)		<i>Neobuthus verae</i> sp. n.	<i>Neobuthus osoli</i> sp. n.	<i>Neobuthus osoli</i> sp. n.
		♀ holotype	♂ holotype	♀ paratype
Carapace	L / W	3.31 / 3.83	2.23 / 2.32	3.03 / 3.40
Mesosoma	L	11.12	4.69	6.31
Tergite VII	L / W	1.85 / 3.40	1.22 / 2.38	1.57 / 3.18
Metasoma + telson	L	15.55	11.10	15.13
Segment I	L / W / D	2.01 / 2.18 / 1.92	1.35 / 1.41 / 1.29	1.89 / 1.92 / 1.66
Segment II	L / W / D	2.16 / 1.94 / 1.82	1.63 / 1.29 / 1.32	2.13 / 1.76 / 1.73
Segment III	L / W / D	2.29 / 1.94 / 1.85	1.64 / 1.27 / 1.26	2.44 / 1.71 / 1.71
Segment IV	L / W / D	2.62 / 1.91 / 1.76	1.87 / 1.23 / 1.23	2.67 / 1.66 / 1.58
Segment V	L / W / D	3.37 / 1.94 / 1.56	2.43 / 1.22 / 1.03	3.33 / 1.61 / 1.39
Telson	L / W / D	3.10 / 1.51 / 1.40	2.18 / 0.86 / 0.77	2.67 / 1.18 / 1.12
Pedipalp	L	7.85	5.64	7.51
Femur	L / W	1.75 / 0.91	1.40 / 0.52	1.83 / 0.74
Patella	L / W	2.63 / 1.31	1.94 / 0.76	2.52 / 1.12
Chela	L	3.47	2.30	3.16
Manus	W / D	0.92 / 1.00	0.51 / 0.51	0.72 / 0.75
Movable finger	L	2.34	1.28	2.11
<b>Total</b>	<b>L</b>	<b>29.98</b>	<b>19.02</b>	<b>24.47</b>

**Table 2.** Comparative measurements of adults of *Neobuthus verae* sp. n. and *N. osoli* sp. n. Abbreviations: length (L), width (W, in carapace it corresponds to posterior width), depth (D).

developed; segment V with strong, granulate to dentate-lobate ventrolateral carinae; segments I–V with dense granulation on all intercarinal surfaces except dorsal surfaces which are sparsely granulated in female; segment V densely granular on lateral and ventral surfaces, more coarsely so on ventral surface, granules not arranged along any traces of carinae; telson smooth, ventral surface sparsely, weakly granular; vesicle slightly elongated; aculeus stout, shorter than vesicle, tip of aculeus almost vertically directed.

**Measurements.** See Table 2.

**AFFINITIES.** The described features distinguish *N. osoli* sp. n. from all other species of the genus. They are recounted in the key below and confirmed by DNA phylogeny (paper in preparation). The new species is most similar to *N. amoudensis*, from which it is distinguished mainly according to two important characters. Metasomal macrosetae are moderately short in male, not very spiniform in *N. amoudensis*, while metasomal macrosetae are very short in male, stout and spiniform in *N. osoli* sp. n. (Fig. 426). Sternite III with ca 25 macrosetae (fig. 10 in Kovářik et al., 2018: 7) in *N. amoudensis* versus sternite III with lesser than 10 macrosetae (Fig. 83) in *N. osoli* sp. n.

***Neobuthus verae* sp. n.**

(Figs. 122–143, 160, Table 2)

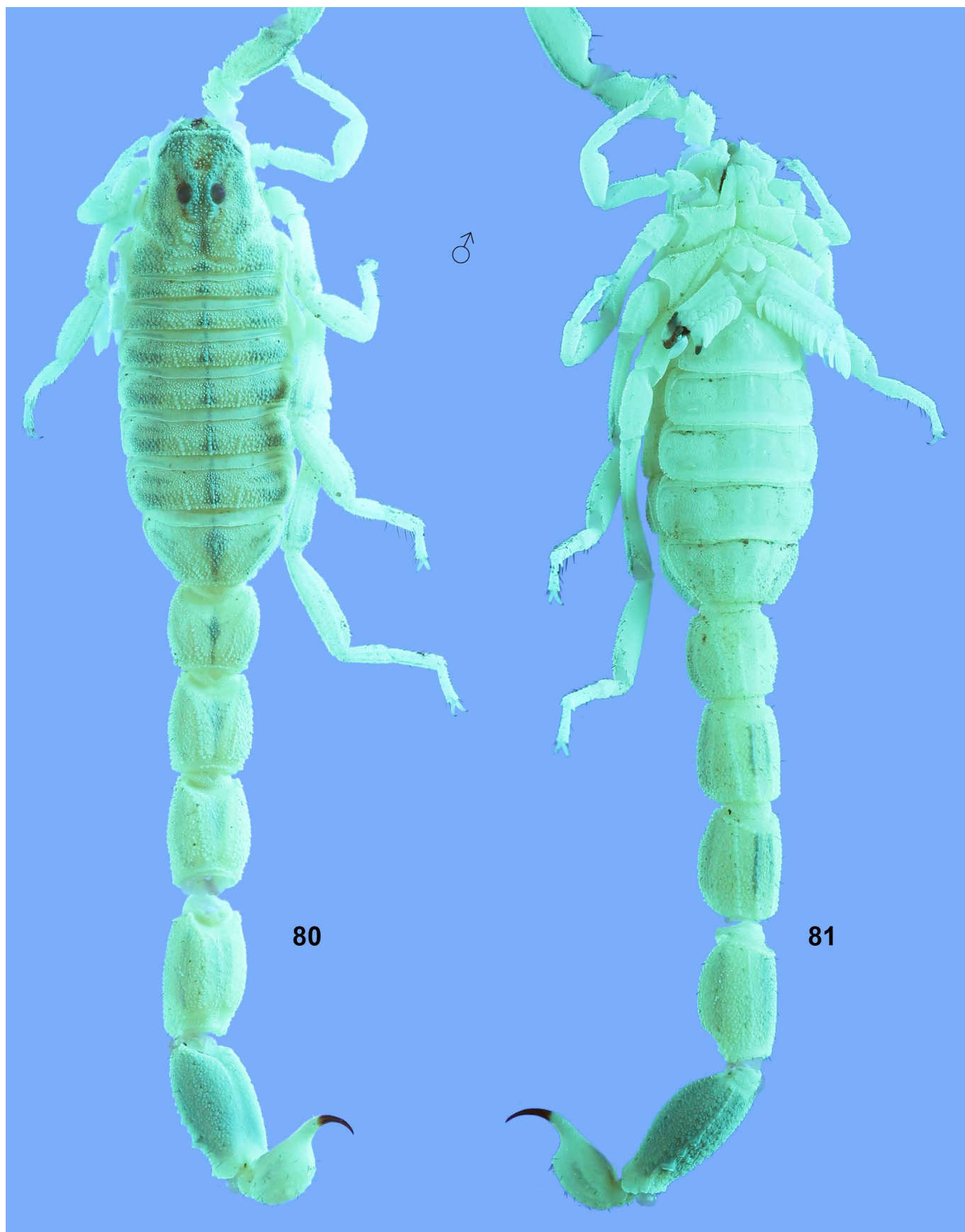
<http://zoobank.org/urn:lsid:zoobank.org:act:B3A2ED0B-524B-4BAC-A56E-FD908D93546A>

**TYPE LOCALITY AND TYPE DEPOSITORY.** Somaliland, Sool Region, E of Las Anod, 8.530814°N 47.420496°E, 623 m a. s. l., FKCP.

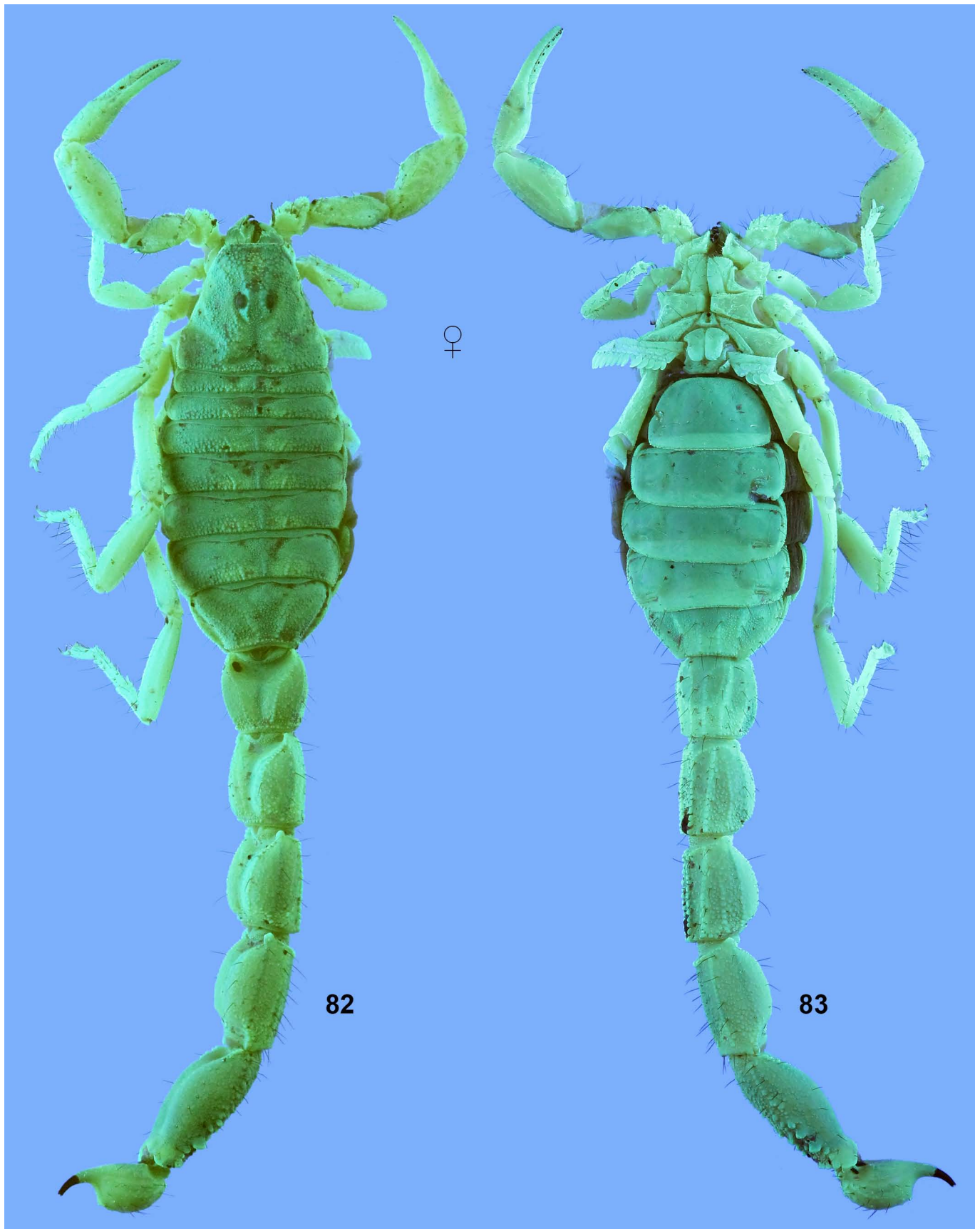
**TYPE MATERIAL EXAMINED.** Somaliland, Sool Region, E of Las Anod, 8.530814°N 47.420496°E, 623 m a. s. l., (Locality No. 21SC, fig. 59 in Kovářik et al., 2024: 15), 8.X.2021, 1♀ (holotype, DNA No. 2133), leg. F. Kovářik.

**ETYMOLOGY.** It is a pleasure to name this species after Vera Opatova, the Czech arachnologist. Her phylogenetic analyses highly contribute to the understanding of species diversity and phylogeny across various arachnid groups, including scorpions. The name of this species is derived from her first name, Vera.

**DIAGNOSIS (♀).** Total length of female 30 mm, male unknown; carapace with area between anterior median carinae smooth, orange to partially fuscous; tergites with 3 dark stripes, median stripe flanked on either side by broad longitudinal yellow bands that may be broken by fuscosity extending across anterior tergites; pedipalp, female with femur L/W 1.92, patella L/W 2.00, chela L/W 3.77; chela movable finger with 4 complete subrows of primary denticles and 5 external accessory denticles flanking proximal end of each subrow; fixed finger with 3 subrows of primary denticles; dorsoexternal carina on pedipalp patella in female absent to weakly indicated, ventroexternal carina absent; posterior margins of tergites without macrosetae; pedipalps, legs, metasoma and telson with long, fine setae in female; female with sternites III–VII smooth without carinae; metasoma I–III with median lateral carinae indicated; lateral surfaces of metasoma I–IV densely granulated; tarsi with relatively sparse setation, leg III of adult female with ca 18 ventral macrosetae on telotarsus; pectine teeth 14 in female.

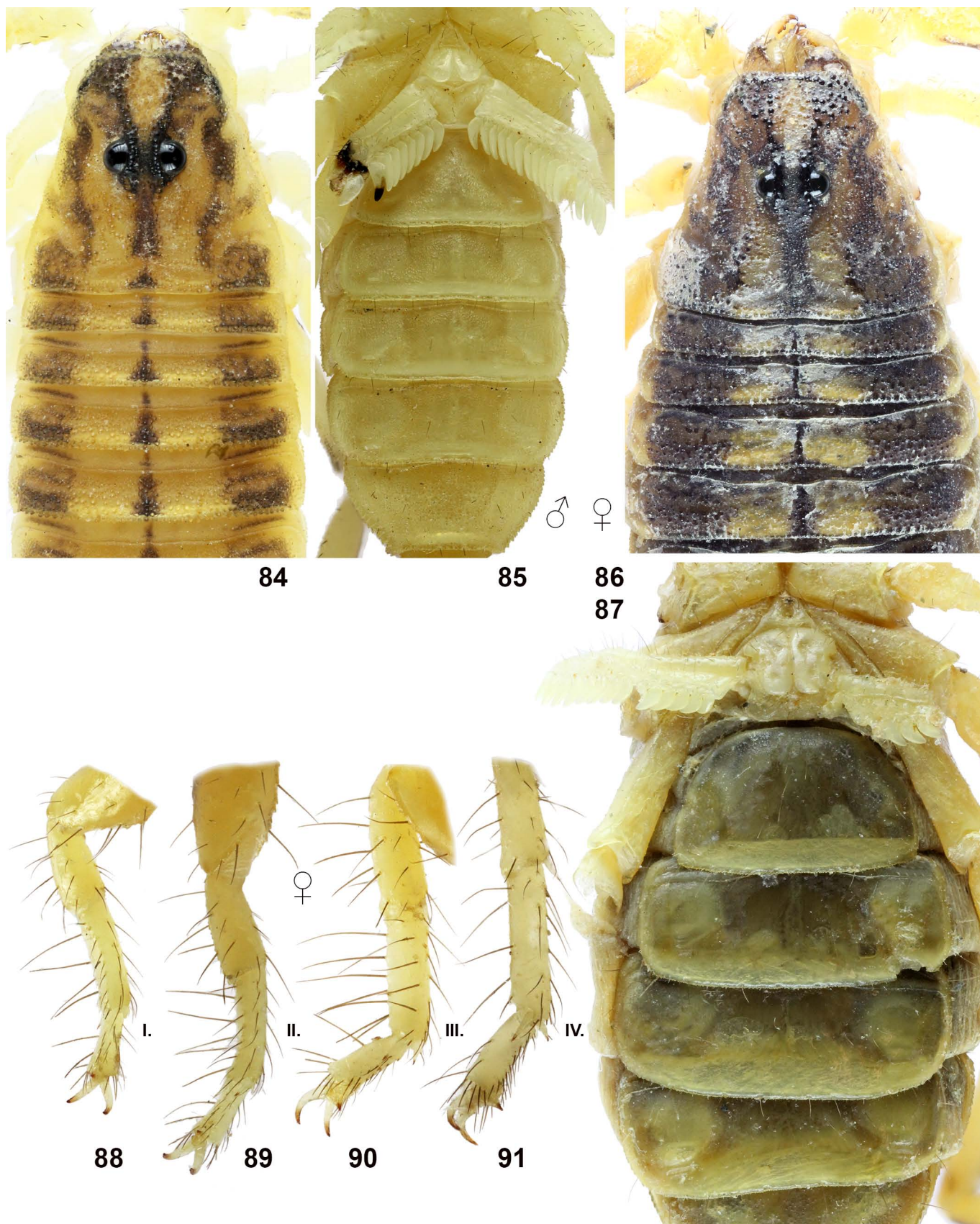


Figures 80–81. *Neobuthus osoli* sp. n., male holotype, dorsal (80) and ventral (81) views under UV fluorescence.



Figures 82–83. *Neobuthus osoli* sp. n., female paratype, dorsal (82) and ventral (83) views under UV fluorescence.





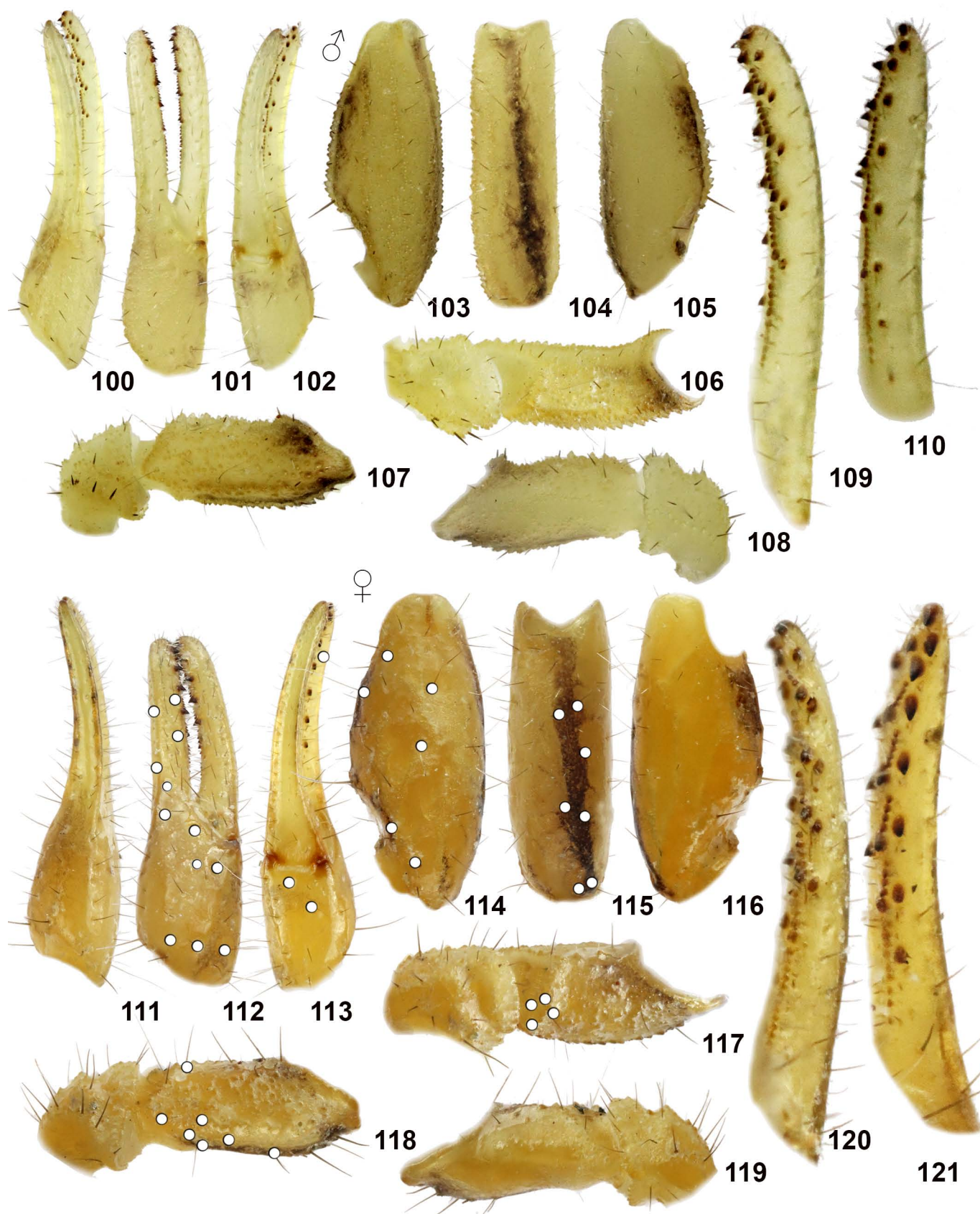
**Figures 84–91:** *Neobuthus osoli* sp. n. **Figures 84–85:** Male holotype, carapace and tergites I–IV (84), coxosternal area and sternites (85). **Figures 86–91:** Female paratype, carapace and tergites I–IV (86), coxosternal area and sternites (87), and left legs I–IV, retrolateral aspect (88–91).



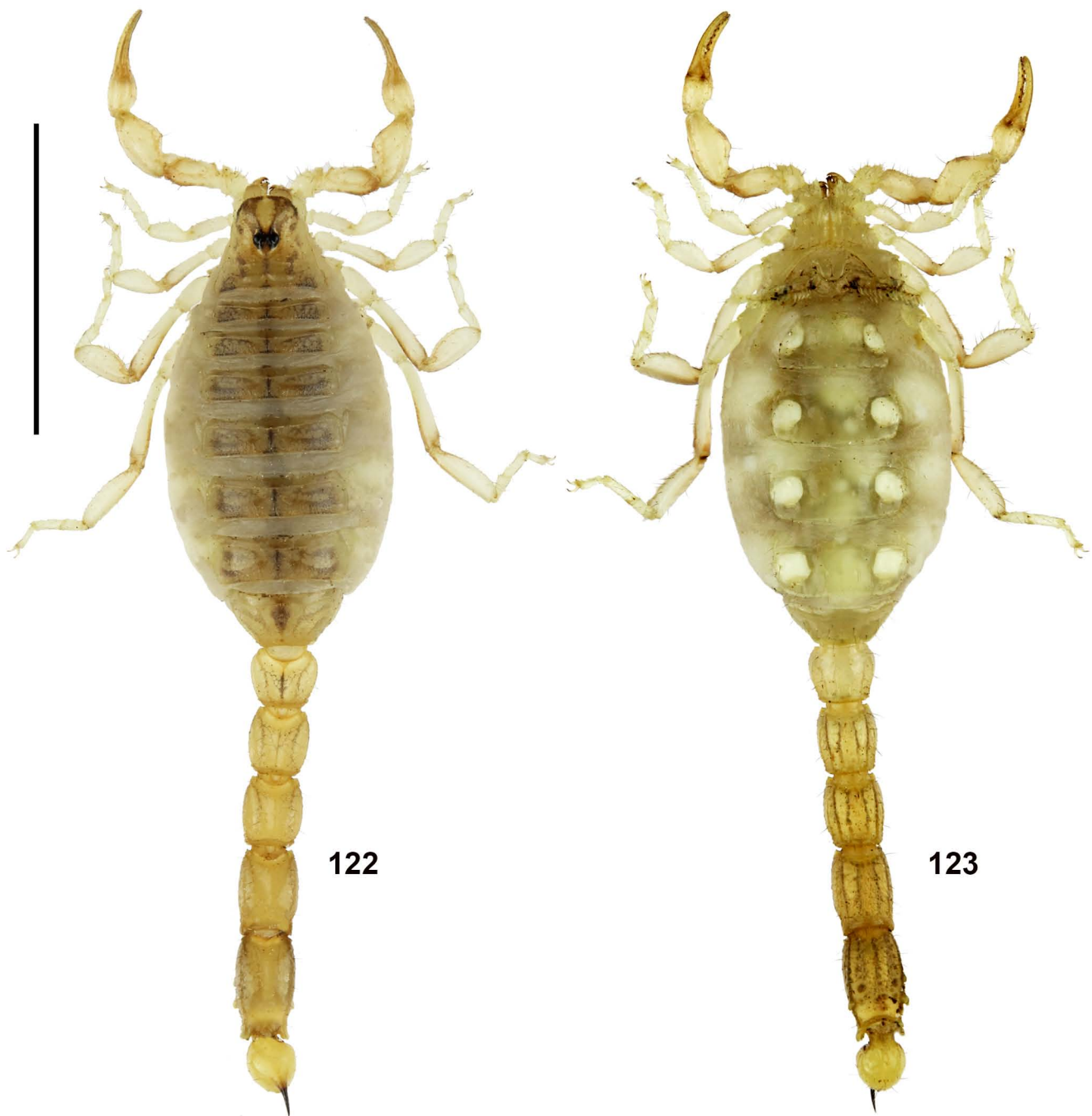


**Figures 92–99:** *Neobuthus osoli* sp. n. **Figures. 92, 94–96.** Male holotype, telson lateral (92), metasoma and telson lateral (94), ventral (95), and dorsal (96) views. **Figures. 93, 97–99.** Female paratype, telson lateral (93), metasoma and telson lateral (97), ventral (98), and dorsal (99) views. Scale bars: 5 mm (94–96, 97–99).





**Figures 100–121:** *Neobuthus osoli* sp. n., pedipalp. **Figures 100–110:** Male holotype, chela dorsal (100), external (101), and ventral (102) views, patella dorsal (103), external (104) and ventral (105) views, femur and trochanter internal (106), dorsal (107), and ventral (108) views, movable (109) and fixed (110) finger dentate margin. **Figures 111–121:** Female paratype, chela dorsal (111), external (112), and ventral (113) views, patella dorsal (114), external (115) and ventral (116) views, femur and trochanter internal (117), dorsal (118) and ventral (119) views, movable (120) and fixed (121) finger dentate margin. The trichobothrial pattern is indicated in Figures 112–115, 117–118 (white circles).



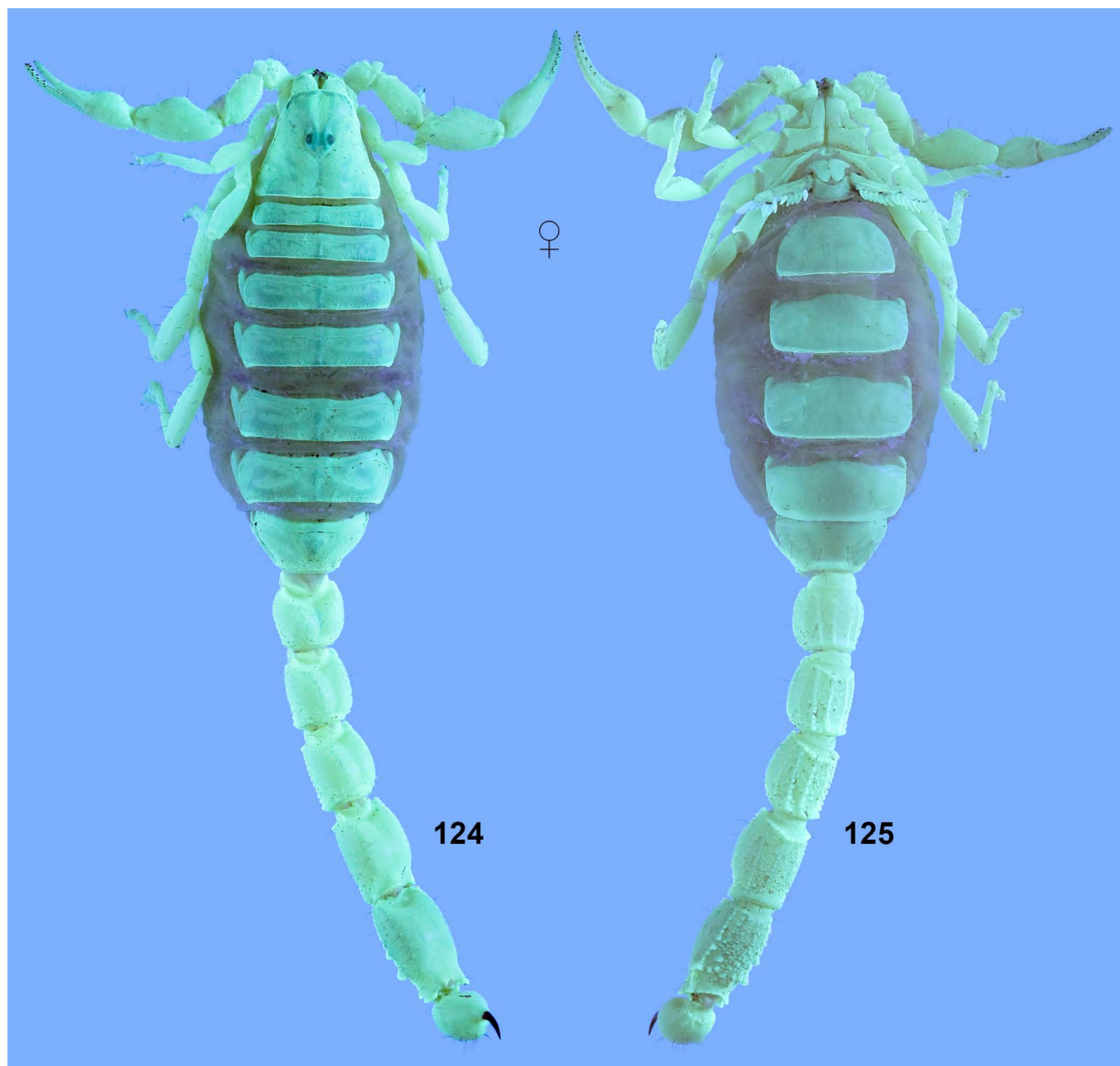
**Figures 122–123:** *Neobuthus verae* sp. n., female holotype, dorsal (122) and ventral (123) views. Scale bar: 10 mm.

**DESCRIPTION.** Total length of adult female 30 mm, male unknown; measurements of carapace, telson, segments of metasoma and pedipalps given in Table 1; positions and distribution of trichobothria of pedipalps shown in Figs. 133–136, 138–139; trichobothrium  $d_2$  present on pedipalp femur and patella; base color yellow to light orange with variable fuscous pigmentation and reduced patterns of dark maculation on mesosoma, metasoma, pedipalps and legs; chelicerae yellow with dark reticulation on anterior manus, dentition reddish. *Sexual dimorphism:* unknown.

**Pedipalp** (Figs. 132–142). Pedipalp mostly sparsely hirsute; smooth in female; femur with five incomplete carinae; patella and chela with carinae absent to weakly indicated; chela movable finger with 4 complete subrows of primary denticles and 5 external accessory denticles flanking proximal end of each subrow; fixed finger with 3 subrows of primary denticles flanking proximal end of each subrow.

**Carapace** (Figs. 124, 126). Strongly trapezoidal (narrower anteriorly), wider than long ( $L/W$  0.86); posterior median postocular area flat, anterior median preocular area gently

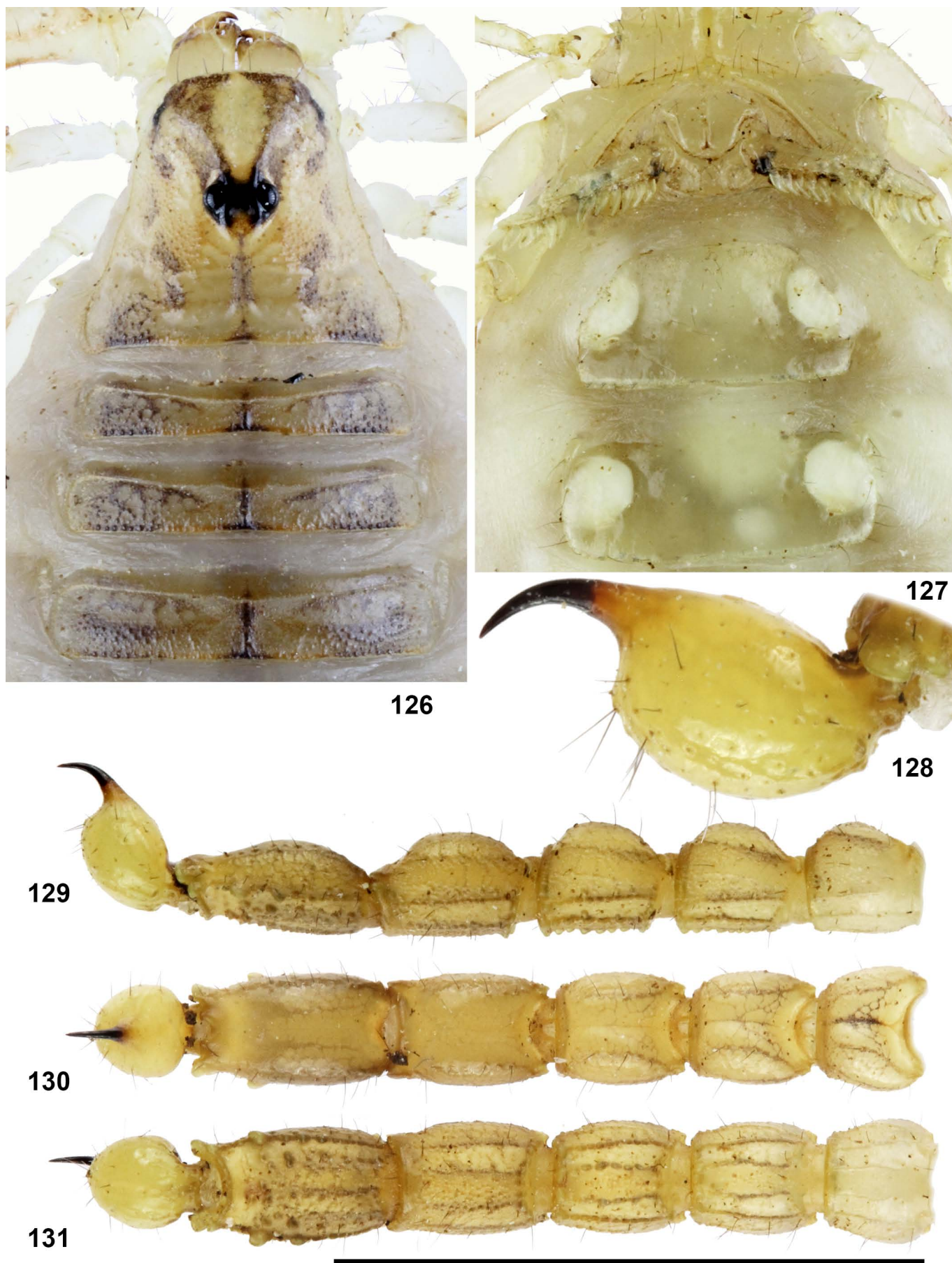




**Figures 124–125.** *Neobuthus verae* sp. n., female holotype, dorsal (124) and ventral (125) views under UV fluorescence.

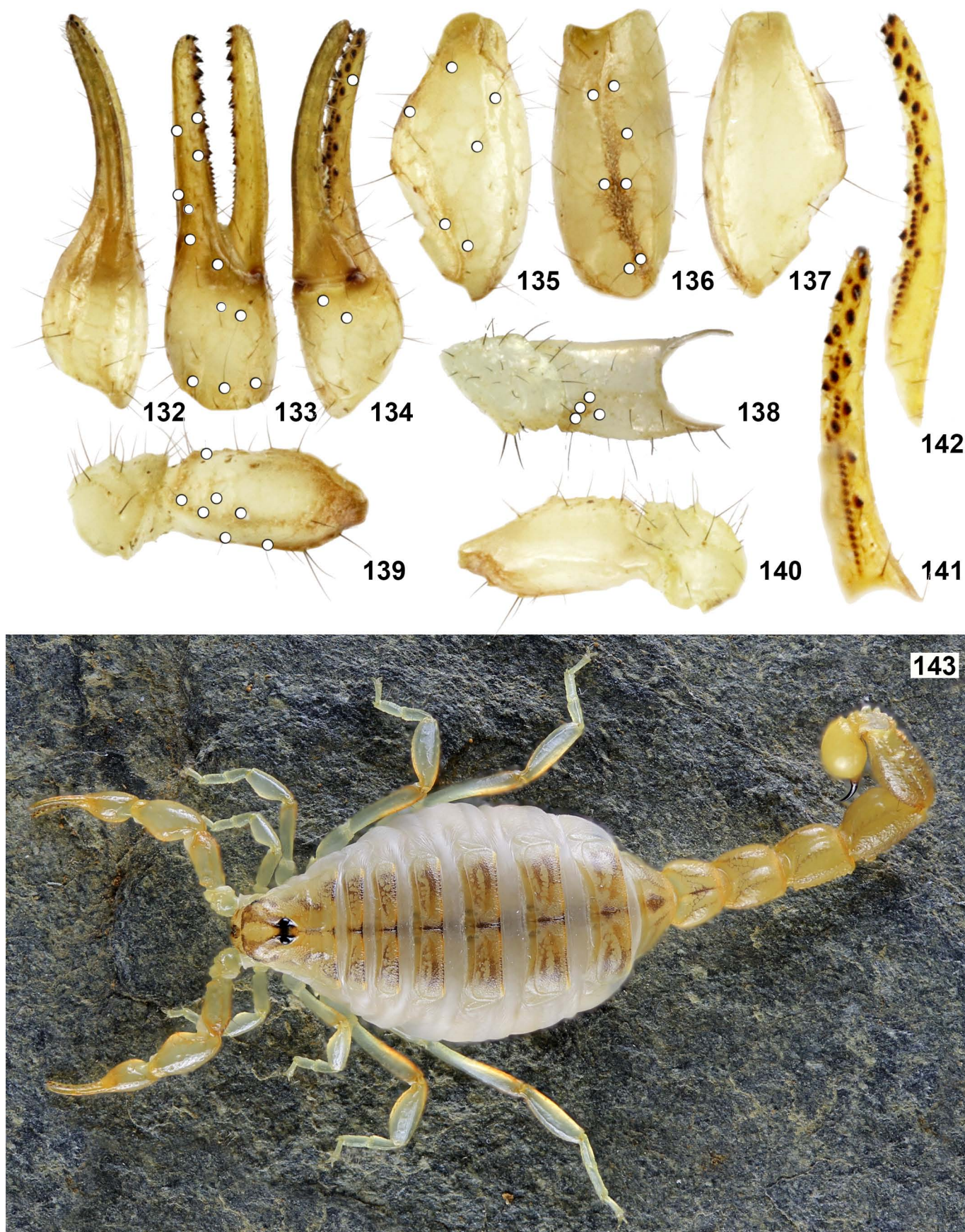
sloped downwards towards anterior margin; lateral flanks steeply sloped; ocular tubercle broad, prominent, located slightly anterior of carapace; anterior margin almost straight, finely microdenticulate, with granules overlapping edge, bearing 6 macrosetae; anterior median carinae present, other carinae indistinct; dense granulation covering most of carapace. **Chelicera.** Fingers with typical buthid dentition (Vachon, 1963; Lowe & Kovařík, 2016; Kovařík et al., 2018); fixed finger with large distal denticle, 1 subdistal denticle and 2 basal denticles fused into bicus, single denticle on ventral surface at level of bicus; dorsal margin of movable finger with 5 denticles: 1 large distal denticle, medium-sized subdistal and medial, and 2 small, partially fused basal denticles; ventral margin with 2 denticles.

**Mesosoma** (Figs. 122–127). Tergites I–VI bear three carinae of which the lateral pair may be less conspicuous mainly on tergites I–IV; tergite VII bears five not well-defined carinae (median, submedians and laterals); tergites I–VI granular mainly on posterior part; tergite VII finely granular; sternites III–VII smooth without carinae; sternite III with ca 18 macrosetae; sternum type 1, triangular in shape, smooth, with deep posteromedian invagination; genital opercula smooth; genital papillae present; pectines extending to around end of sternite III in female; pectine teeth 14 in female; combs with 3 marginal lamellae and 7–8 middle lamellae; marginal lamellae, middle lamellae and fulcra with dense cover of short dark reddish macrosetae; fulcra with 2–4 setae.



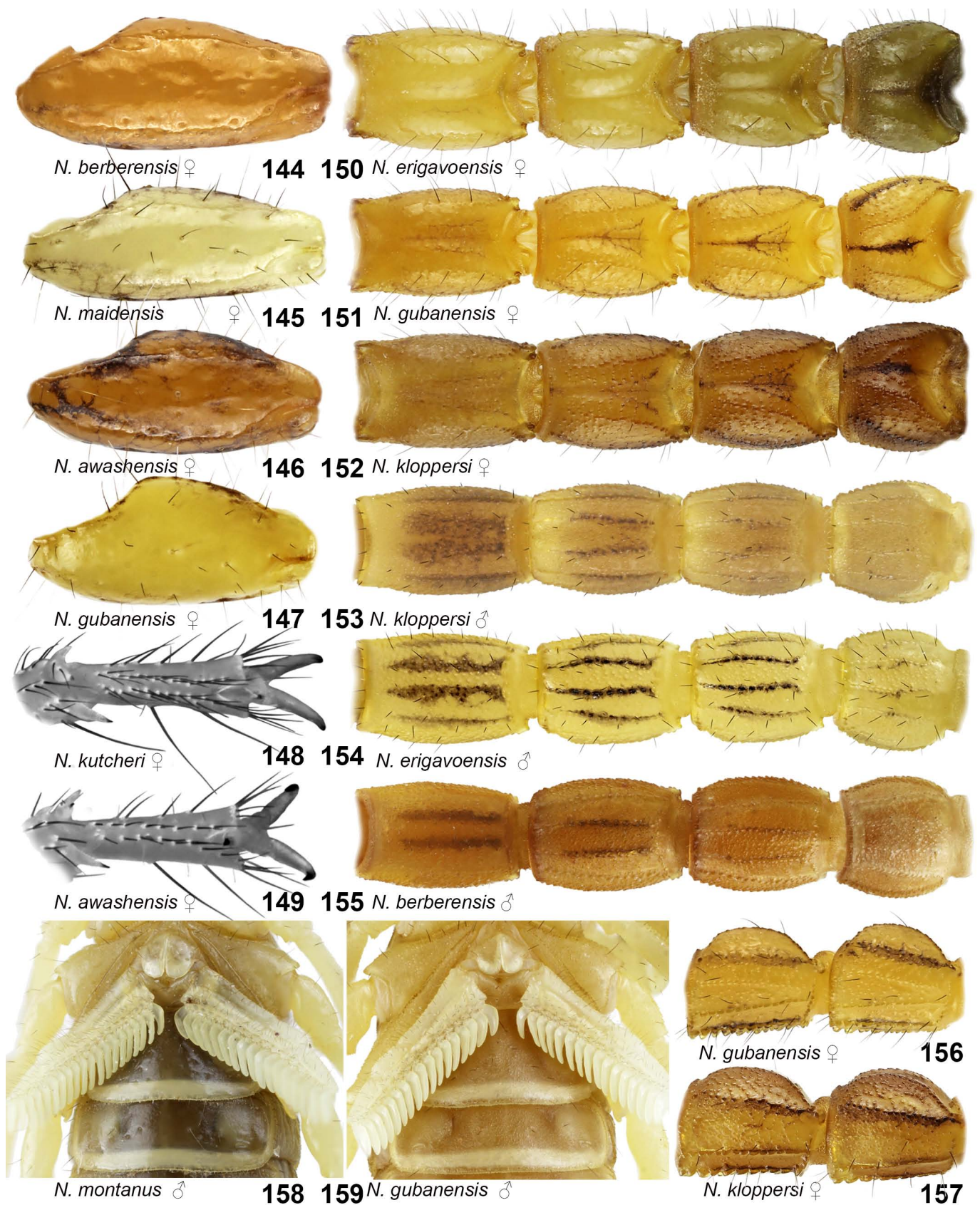
**Figures 126–131:** *Neobuthus verae* sp. n., female holotype. **Figures 126–127:** Carapace and tergites I–III (126) and coxosternal area and sternites (127). **Figure 128.** Telson lateral view. **Figures 129–131.** Metasoma and telson lateral (129), dorsal (130), and ventral (131) views. Scale bar: 10 mm (129–131).





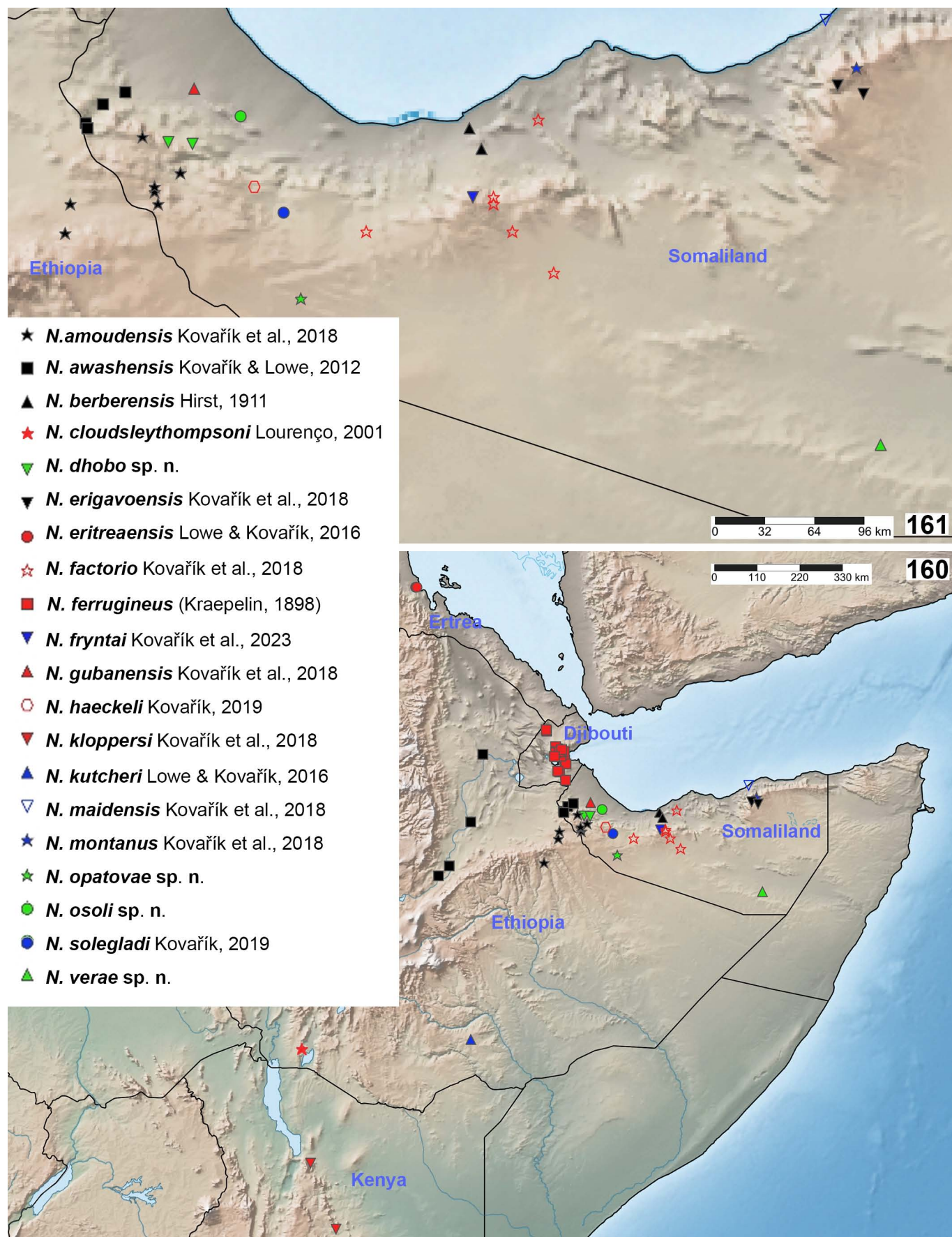
**Figures 132–143:** *Neobuthus verae* sp. n., female holotype. **Figures 132–142:** Segments of pedipalp, chela dorsal (132), external (133), and ventral (134) views, patella dorsal (135), external (136) and ventral (137) views, femur and trochanter internal (138), dorsal (139), and ventral (140) views, fixed (141) and movable (142) finger dentate margin. The trichobothrial pattern is indicated in Figures 133–136, 138–139 (white circles). **Figure 143.** Female paratype in vivo habitus.





**Figures 144–159:** *Neobuthus*, main characters used in the key of species (modified from Kovařík et al., 2018). **Figures 144–147.** Pedipalp patella, dorsal view, female of *N. berberensis* (144), female of *N. maidensis* (145), female of *N. awashensis* (146), and female of *N. gubanensis* (147). **Figures 148–149.** Telotarsus III, ventral aspect, female of *N. kutcheri* (148), and female of *N. awashensis* (149). **Figures 150–152.** Metasoma IV–I, dorsal view, female of *N. erigavoensis* (150), female of *N. gubanensis* (151), and female of *N. kloppersi* (152). **Figures 153–155.** Metasoma IV–I, ventral view, male of *N. kloppersi* (153), male of *N. erigavoensis* (154) and male of *N. berberensis* (155). **Figures 156–157.** Metasoma III–II, lateral view, female of *N. gubanensis* (156), and female of *N. kloppersi* (157). **Figures 158–159.** Sternites III–IV, male of *N. montanus* (158), and male of *N. gubanensis* (159).





Figures 160–161. Map showing confirmed distribution of *Neobuthus* spp. (160) with detail for Somaliland (161).

**Legs.** Coxa, femora, patella and tibia of all legs bearing variable numbers of short to medium length, straight, dark-reddish macrosetae; tarsi with mix of short and longer, dark-reddish macrosetae; telotarsi with two rows of short macrosetae on ventral aspect, 12 macrosetae on telotarsus III; tibial spurs reduced on legs III and IV.

**Metasoma and telson** (Figs. 128–131). Metasoma and telson sparsely hirsute, long, fine setae in female; metasomal segments I–III with 8–10 carinae (median lateral carinae indicated), IV with 8 carinae, V with 2 carinae; carinae relatively well developed; segment V with strong, granulate to dentate-lobate ventrolateral carinae; segments I–V with dense granulation on all intercarinal surfaces except dorsal surfaces which are smooth in female; ventromedial carinae on metasoma II–III lobate; telson smooth; vesicle elongated; aculeus stout, shorter than vesicle, tip of aculeus almost vertically directed.

**Measurements.** See Table 2.

**AFFINITIES.** The described features distinguish *N. verae* **sp. n.** from all other species of the genus. They are recounted in the key below, the new species is most similar to *N. berberensis*, above all, in the light coloring, which distinguishes these two species from other species of the genus. *N. verae* **sp. n.**, however, has an unique pedipalp fingers dentation. Pedipalp chela movable finger with 4 complete subrows of primary denticles and 5 external accessory denticles; fixed finger with 3 subrows of primary denticles (Figs 141–142) while *N. berberensis* has chela movable finger with 5–6 subrows of primary denticles and 3–5 external accessory denticles.

### Key to the species of *Neobuthus*

1. Pedipalps with numerous macrosetae (Figs. 145–147). 2  
– Pedipalps very sparsely setose, or devoid of macrosetae (Fig. 144). .....  
*N. berberensis* Hirst, 1911 (population from sandy area)
2. Pedipalp chela movable and fixed finger with 4–6 subrows of primary denticles. If movable finger has only 4 subrows, there are 3–4 external accessory denticles. . 3  
– Pedipalp chela movable finger with 4 complete subrows of primary denticles and 5 external accessory denticles; fixed finger with 3 subrows of primary denticles (Fig. 142). ..... *N. verae* **sp. n.**
3. Metasomal macrosetae moderately short in male, not very spiniform (Fig. 154). ..... 4  
– Metasomal macrosetae very short in male, stout and spiniform (Fig. 153). ..... 13
4. Tarsi densely hirsute, adults 24–37 ventral macrosetae on telotarsus III (Fig. 148). .....  
..... *N. kutcheri* Lowe & Kovařík, 2016  
– Tarsi not densely hirsute; adults with 9–21 ventral macrosetae on telotarsus III (Fig. 149). ..... 5
5. Pedipalp patella narrow, L/W ratio 2.72–2.81 in both sexes (Fig. 145); marginal tips of pectines extend to a quarter of sternite VI in males. ....  
..... *N. maidensis* Kovařík et al., 2018  
– Pedipalp patella narrow, L/W ratio 2.10–2.70 in both sexes (Fig. 146); marginal tips of pectines extend to before half of sternite V in males. .... 6
6. Female metasoma I–III with dorsal carinae absent (Fig. 150). ..... 7  
– Female metasoma I–III with dorsal carinae present (Fig. 151). ..... 9
7. Pedipalps of female yellow with black spots developed or indicated; pedipalp femur L/W 2.18–2.34 in males. .... 8  
– Pedipalps of female yellow without black spots; pedipalp femur L/W 2.45–2.61 in males. ....  
..... *N. erigavoensis* Kovařík et al., 2018
8. Dorsoexternal carina on pedipalp patella in female present (Fig. 146). ..... *N. montanus* Kovařík et al., 2018  
– Dorsoexternal carinae on pedipalp patella in female absent (Fig. 22). ..... *N. dhobo* **sp. n.**
9. Dorsoexternal smooth carinae on pedipalp patella in female well developed (Fig. 146). ..... 10  
– Dorsoexternal carinae on pedipalp patella in female absent or only weakly indicated (Fig. 147). ..... 11
10. Sternite III with ca 25 macrosetae (fig. 10 in Kovařík et al., 2018: 7). ..... *N. amoudensis* Kovařík et al., 2018  
– Sternite III with lesser than 10 macrosetae (fig. 86 in Kovařík & Lowe, 2012: 19). .....  
..... *N. awashensis* Kovařík & Lowe, 2012
11. Sternites III–VI smooth medially in males (Figs. 138, 158). ..... 12  
– Sternites III–VI with dense, fine granulation in males (Figs. 218, 159). ..... *N. gubanensis* Kovařík et al., 2018
12. Male with LW ratio femur 2.74–2.86, patella 2.50–2.62, chela 4.68–4.98. .... *N. fryntai* Kovařík et al., 2023  
– Male with LW ratio femur 2.42–2.70, patella 2.18–2.28, chela 4.25–4.48. .... *N. factorio* Kovařík et al., 2018
13. Female pedipalp femur more elongate, L/W 2.42–2.47. ... 14  
– Female pedipalp femur more stout, L/W 2.10–2.36. .. 16
14. Metasomal segments more elongate, metasoma IV L/D > 1.7, V L/D > 2.35. ....  
..... *N. eritreensis* Lowe & Kovařík, 2016  
– Metasomal segments more stout, metasoma IV L/D < 1.7, V L/D < 2.35. .... 15



15. Lateral surfaces of metasoma I–IV densely granulated in male and smooth in female. Metasoma I–III with median lateral carinae present in female, absent in male. ....  
..... *N. ferrugineus* (Kraepelin, 1898)
- Lateral surfaces of metasoma I–IV densely granulated in both sexes. Metasoma I–III with median lateral carinae absent in both sexes (Figs. 94 and 97). .... *N. osoli* sp. n.
16. Female metasoma I–III dorsally granulated (Fig. 152). ...  
..... 17
- Female metasoma I–III dorsally smooth (Fig. 150). ....  
..... *N. cloudsleythompsoni* Lourenço, 2001
17. Metasoma I–III with median lateral carinae absent in female (Fig. 157). .... *N. kloppersi* Kovařík et al., 2018
- Metasoma I–III with median lateral carinae present in female (Fig. 156). .... 18
18. Male with sternite VII finely granulated with 4, granulated carinae. .... *N. solegladi* Kovařík, 2019
- Male with sternite VII strongly granulated without carinae. ....  
*N. berberensis* Hirst, 1911 (population from a rocky area)

COMMENTS ON KEYS TO SPECIES. The taxonomic positions of most *Neobuthus* species are well supported by DNA and karyotype analysis which is a topic of a separate paper in preparation by colleagues from Charles University of Prague. However, the species key here is created strictly according to morphological characters, which we verified from the specimens examined in this study. The key could be used for a quick orientation in conjunction with the distribution data (see Fig. 160). There is a possibility that additional specimens may show intraspecific variability in some characters used in this key for separation at the species level.

We have not included in the keys *Neobuthus haeckeli* Kovařík, 2019 and *N. opatovae* sp. n. (Somaliland), from which female is unknown; however, its validity is confirmed by DNA phylogeny (paper in preparation); see Affinities.

We also did not include *N. sudanensis* Lourenço, 2005 in this key because we have not had the opportunity to examine the female holotype, and the poor original description lacks details needed to differentiate it from other members of the genus.

## Acknowledgments

Thanks are due to Zdeněk Faltýnek, Petr Kabátek, Tomáš Mazuch and Petr Benda (Czech Republic), and Abdiqaadir Abdilahi (Somaliland) who participated and helped in the expeditions to Somaliland. Thanks to Věra Opatová and Jana Štundlová for sharing the DNA phylogeny of *Neobuthus* (in preparation) which confirmed the validity of species described here. Special thanks to Amoud University Management, including Prof. Suleiman Ahmed Gule, former president, Dr. Mohamed Muse Jibril, current President, and vice presidents.

Moreover, we also like to thank Minister Shukuri Haji Ismail and Director Abdinasir Hussein (Ministry of Environment & Climate Change, Hargeisa, Somaliland), and many local people for their help. Further, we thank two reviewers for their comments on the manuscript.

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