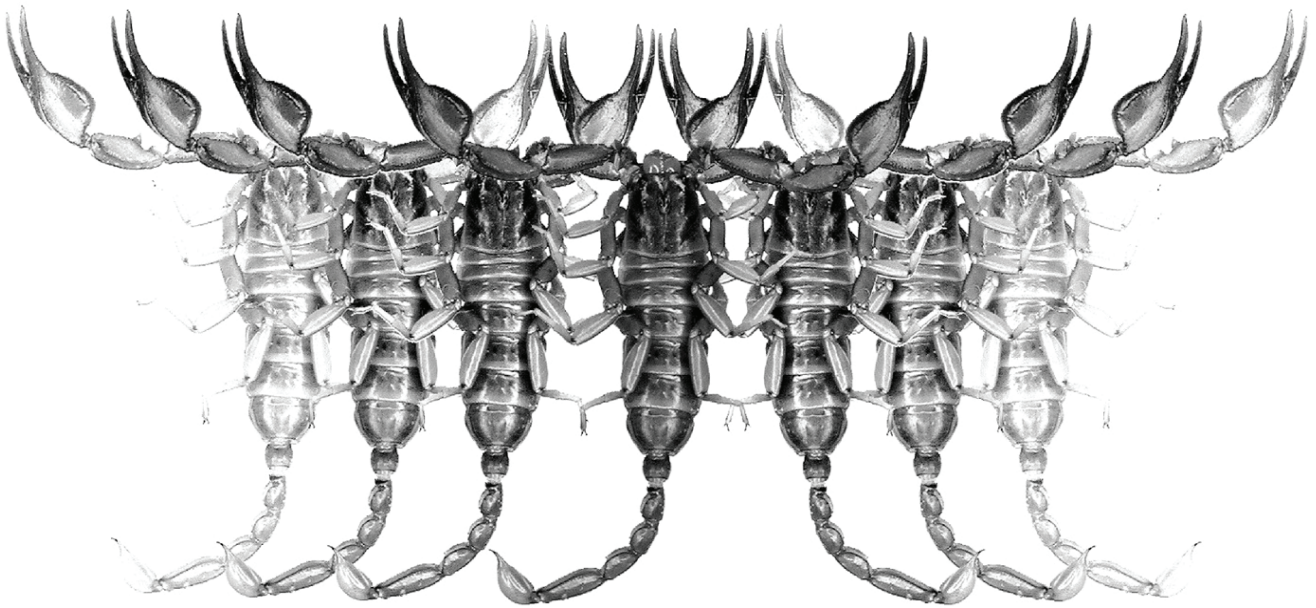


Euscorpius

Occasional Publications in Scorpiology



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

František Kovařík

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Euscorpius

Occasional Publications in Scorpiology

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

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<http://zoobank.org/urn:lsid:zoobank.org:pub:07C4C2D6-E904-41DF-9B26-B7C80C689CDC>

Summary

New information about taxonomy and distribution of the genus *Neobuthus* Hirst, 1911 is presented, based on material recently collected in Somaliland. *N. awashensis* Kovařík & Lowe, 2012 is reported from Somaliland for the first time. Two new species are described, *N. haeckeli* sp. n. and *N. solegladi* sp. n. An updated distribution map of the genus *Neobuthus* is provided.

Introduction

The buthid genus *Neobuthus* includes several small scorpion species from northeastern Africa (Horn of Africa), which were revised by Kovařík et al. (2018). In 2019, I had an opportunity to participate in another expedition to Somaliland, during which 26 *Neobuthus* specimens were collected from five localities, representing four species: *Neobuthus amoudensis* Kovařík et al., 2018, *N. awashensis* Kovařík & Lowe, 2012 (first record from Somaliland), and two new, hereby described species, *N. haeckeli* sp. n. and *N. solegladi* sp. n. The new records are added to the updated map of distribution of the genus *Neobuthus*.

Methods, Material & Abbreviations

Nomenclature and measurements follow Vachon (1963), 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).

Systematics

Family Buthidae C. L. Koch, 1837

Neobuthus Hirst, 1911

(Figures 1–70, Table 1)

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.

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 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



Figures 1–2. *Neobuthus haeckeli* sp. n., paratype male in vivo habitus (1) and type locality (2).

or neobothriotaxic minorante, dorsal trichobothria of femur arranged in β -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.

Neobuthus amoudensis Kovařík et al., 2018

(Figure 70)

Neobuthus ferrugineus: Kovařík & Lowe, 2012: 3–7 (in part, male from Ethiopia).

Neobuthus amoudensis Kovařík et al., 2018: 4–14, figs. 1–54, 402, 438, tables 1 and 5.

TYPE LOCALITY AND TYPE DEPOSITORY. Somaliland, Borama, Amoud University campus, 09°56'49"N 43°13'23"E, 1394 m a.s.l.; FKCP.

ADDITIONAL MATERIAL EXAMINED (NOT CITED IN KOVAŘÍK ET AL., 2018). **Somaliland**, Borama, Amoud University campus, 09°56'49"N 43°13'23"E, 1394 m a. s. l. (Locality No. **19SA** (=17SA/), 23.VI.2019, 1♂2♀ (topotypes), leg. F. Kovařík, FKCP; Kidile, 20 km of Borama, 10°00'06.6"N 43°12'26.3"E, 1427 m a. s. l. (Locality No. **19SB**), 28.VI.2019, 4♂ (1681, 1654), leg. T. Mazuch, FKCP.

Neobuthus awashensis Kovařík & Lowe, 2012

(Figure 70)

Neobuthus awashensis Kovařík & Lowe, 2012: 7–16, figs. 5–6, 18–21, 34–38, 44–47, 67–74, 86, 89, 92, 95–96, 100–101; Kovařík et al., 2015: 30; Lowe & Kovařík, 2016: 2–4, figs. 1–6, 158, 161–165; Kovařík et al., 2018: 14, figs. 55–56, 403, 418, 421, 438, table 5.

TYPE LOCALITY AND TYPE REPOSITORY. Ethiopia, Awash, Metahara env., 08°54'N 39°54'E, 960–1050 m a. s. l., FKCP.

ADDITIONAL MATERIAL EXAMINED (NOT CITED IN KOVAŘÍK ET AL., 2018). **Somaliland**, Habas village, 10°24'42.6"N 42°48'40.1"E, 866 m a. s. l. (Locality No. **19SD**), 30.VI.2019, 3♂ (1682, 1718, 1719) 1♀, leg. F. Kovařík, FKCP; 5 km of Jidhi village, 10°35'04"N 43°02'16.9"E, 515 m a. s. l. (Locality No. **19SF**), 1.VII.2019, 3♂ (1698, 1700) 2♀ (1661), leg. F. Kovařík, FKCP.

Neobuthus haeckeli sp. n.

(Figures 1–26, 70, Table 1)

<http://zoobank.org/urn:lsid:zoobank.org:act:CC1873AB-069D-49BD-8E2C-98CE9BA9672F>

TYPE LOCALITY AND TYPE DEPOSITORY. Somaliland, Cali Haidh, 10°02'50.6"N 43°47'08.7"E, 1056 m a. s. l.; FKCP.

TYPE MATERIAL EXAMINED. **Somaliland**, Cali Haidh, 10°02'50.6"N 43°47'08.7"E, 1056 m a. s. l. (Locality No. **19SN**), 8.VII.2019, 7♂ (holotype and paratypes, 1697, 1712, 1713, 1715, 1716), leg. F. Kovařík & T. Mazuch, FKCP.

ETYMOLOGY. The name honors Czech entomologist, my friend and physician Martin Häckel who visited Somaliland with me and knows my body from inside.

DIAGNOSIS. Total length of adult males 17–20 mm; female unknown; carapace with area between anterior median carinae pale, densely granular; tergites with 3 dark stripes; pedipalp relatively slender, males with femur L/W 2.22–2.36, patella L/W 2.28–2.36, chela L/W 4.44–4.58; chela movable finger with 5 subrows of primary denticles, 4 external accessory denticles flanking proximal end of each subrow; trichobothria d_2 present on femur and patella; dorsoexternal and ventroexternal carinae on pedipalp patella present, smooth; posterior margins of tergites usually lacking macrosetae; pedipalps, legs, metasoma and telson with moderately short, stout macrosetae in males; males with coxae sparsely granulated, sternites III–VI shagreened to smooth medially and granulate laterally, sternite VII densely granulated with 4 well-defined, granulated carinae; metasoma I–II with median lateral carinae present in males; lateral surface of metasoma V in males densely granulated, with granules separated; soles of telotarsi with relatively sparse setation, leg III of adults with 10–12 ventral macrosetae on telotarsus; pectine teeth 16–19 in males.

DESCRIPTION. Total length of adult males 17–20 mm, female unknown; measurements of carapace, telson, segments of metasoma and pedipalps given in Table 1; positions and distribution of trichobothria on pedipalps shown in Figs. 6–9, and 12–13; trichobothrium d_2 present on pedipalp femur and patella; base color pale yellow to light orange with variable fuscous pigmentation (Figs. 1, 3–4) and extensive patterns of dark maculation on pedipalps, mesosoma, metasoma and partially on legs; chelicerae yellow with dark reticulation on anterior manus, dentition reddish.

Pedipalp (Figs. 5–15). Pedipalp mostly sparsely hirsute; finely granulated in males; femur with five conspicuously granulose carinae, more strongly developed in males; patella with seven granulose carinae in males, and five smooth carinae in females; chela with dorsal and external carinae present. The chela movable and fixed fingers with 5 subrows of primary denticles, 4 external accessory denticles on movable and 4–5 on fixed fingers flanking proximal end of each subrow.



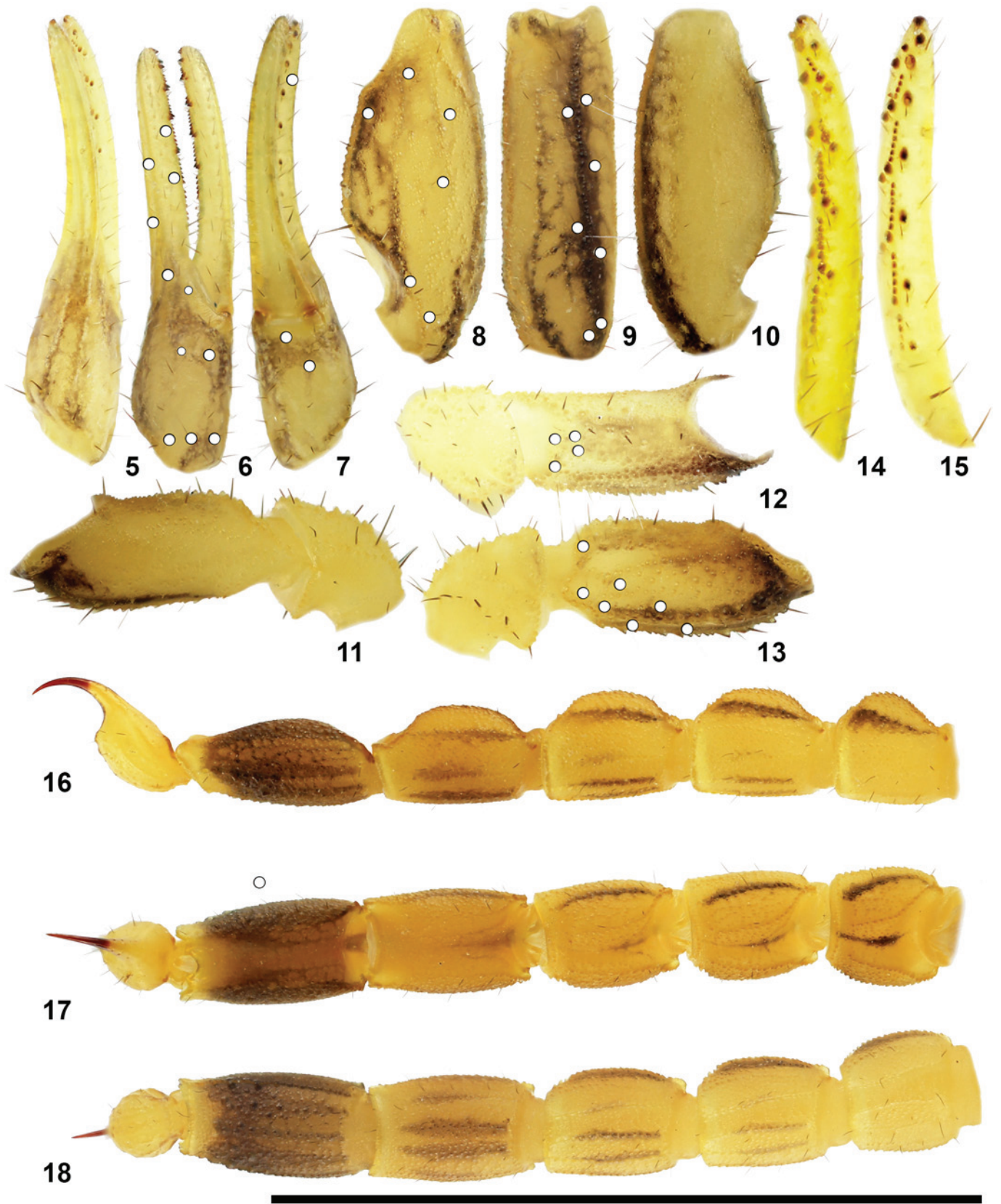
Figures 3–4. *Neobuthus haeckeli* sp. n., holotype male, dorsal (3) and ventral (4) views. Scale bar: 10 mm.

Carapace (Fig. 19). Strongly trapezoidal (narrower anteriorly), approximately wide as long (L/W 0.96–0.99); 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 to middle of carapace; anterior margin straight, finely microdenticulate, with coarser granules overlapping edge, bearing 6–8 macrosetae; anterior median carinae weak, coarsely granular, other carinae indistinct; dense granulation covering most of carapace.

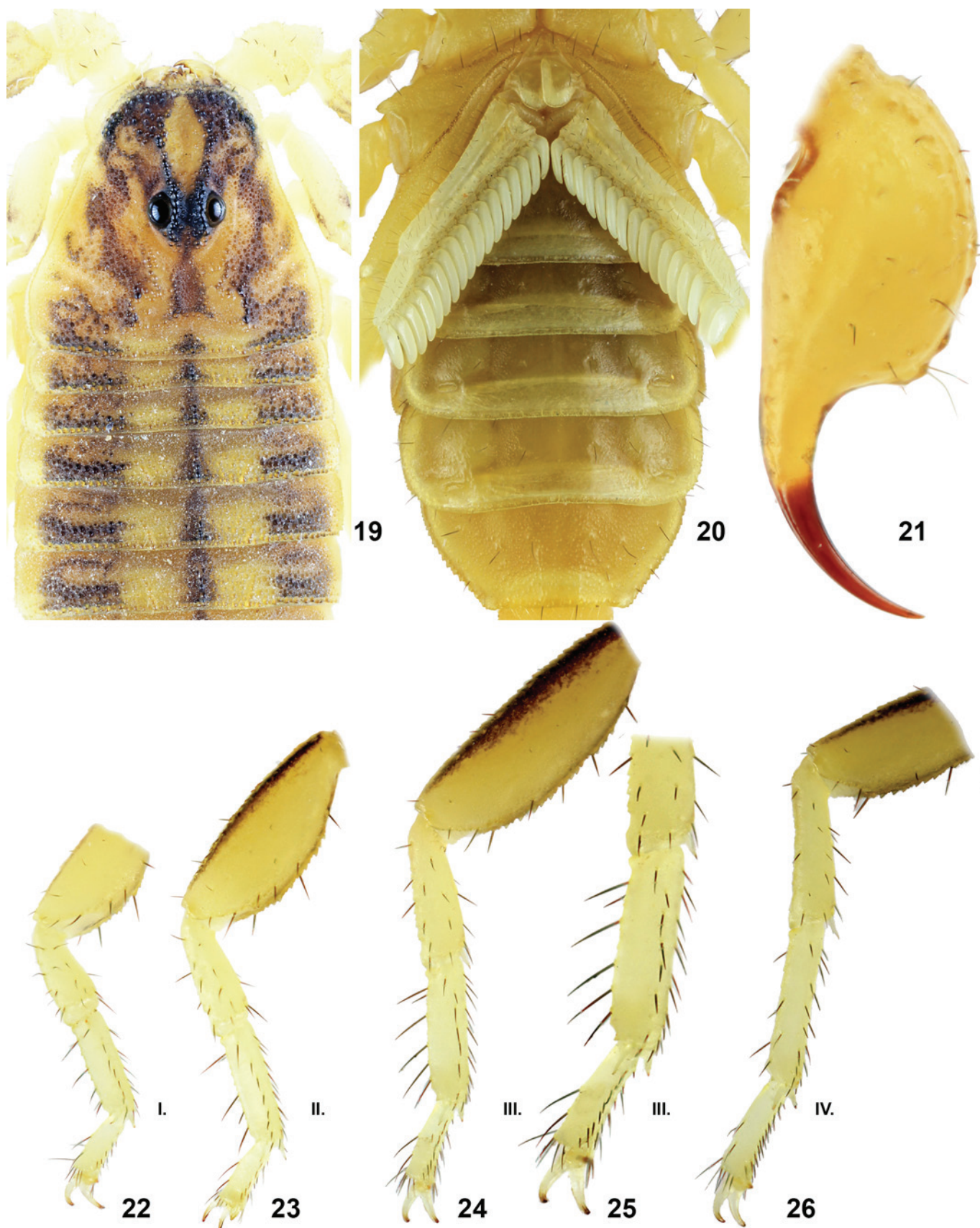
Chelicera. Fingers with typical buthid dentition (Vachon, 1963; Lowe & Kovařík, 2016; Kovařík et al., 2018); fixed finger with large distal denticle, 1 subdistal denticle and 2 basal denticles fused into bicus, single denticle on ventral surface at level of bicus; dorsal margin of movable finger with 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. 19–20). 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 medially and granulate laterally in males; sternite VII with four well-defined carinae, densely, finely granulated in both sexes; sternum type 1, triangular in shape, smooth, with deep posteromedian invagination; genital opercula smooth; genital papillae present; pectines extending to around a quarter of sternite V in male; pectine teeth 16–19 (2 x 16, 7 x 17, 3 x 18, 2 x 19) in males; combs with 3 marginal lamellae and 6–8 middle lamellae;



Figures 5–18: *Neobuthus haeckeli* sp. n., holotype male. **Figures 5–15.** Pedipalp chela, dorsal (5), external (6), and ventral (7) views, pedipalp patella, dorsal (8), external (9) and ventral (10) views, pedipalp femur and trochanter ventral (11), internal (12), and dorsal (13) views, pedipalp movable (14) and fixed (15) fingers dentate margins. The trichobothrial pattern is indicated in Figures 6–10, 12–13 (white circles). **Figures 16–18.** Metasoma and telson lateral (16), dorsal (17), and ventral (18) views. Scale bar: 10 mm (16–18).



Figures 19–26: *Neobuthus haeckeli* sp. n., holotype male, carapace and tergites I–V (19), coxosternal area and sternites (20), telson lateral (21), and right legs I–IV, retrolateral aspect (22–26).

Dimensions (MM)		<i>N. haeckeli</i> sp. n.	<i>N. solegladi</i> sp. n.	<i>N. solegladi</i> sp. n.
		♂ holotype	♂ holotype	♀ paratype
Carapace	L / W	2.569 / 2.570	2.404 / 2.699	3.348 / 3.914
Mesosoma	L	4.308	3.598	5.953
Tergite VII	L / W	1.211 / 2.524	1.077 / 2.524	1.504 / 3.811
Metasoma + telson	L	12.731	11.724	16.390
Segment I	L / W / D	1.612 / 1.681 / 1.428	1.478 / 1.627 / 1.334	2.119 / 2.220 / 1.982
Segment II	L / W / D	1.875 / 1.520 / 1.482	1.574 / 1.435 / 1.386	2.342 / 1.978 / 1.981
Segment III	L / W / D	1.888 / 1.484 / 1.435	1.713 / 1.335 / 1.372	2.580 / 1.960 / 1.900
Segment IV	L / W / D	2.222 / 1.457 / 1.295	2.081 / 1.319 / 1.258	2.887 / 1.938 / 1.703
Segment V	L / W / D	2.737 / 1.330 / 1.145	2.539 / 1.255 / 1.090	3.437 / 1.849 / 1.478
Telson	L / W / D	2.397 / 0.937 / 0.814	2.339 / 0.877 / 0.751	3.025 / 1.349 / 1.151
Pedipalp	L	6.410	5.755	8.443
Femur	L / W	1.578 / 0.694	1.428 / 0.605	2.051 / 0.896
Patella	L / W	2.159 / 0.949	1.960 / 0.858	2.821 / 1.269
Chela	L	2.673	2.367	3.571
Manus	W / D	0.585 / 0.592	0.554 / 0.534	0.888 / 0.791
Movable finger	L	1.751	1.581	2.349
Total	L	19.61	17.73	25.69

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

marginal lamellae, middle lamellae and fulcra with dense cover of short dark reddish macrosetae; fulcra with 2–4 setae.

Legs (Figs. 22–26). Coxa, femora, patella and tibia of all legs bearing variable numbers of 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 setae on ventral aspect, 10–12 macrosetae on telotarsus III; tibial spurs moderate on legs III–IV.

Metasoma and telson (Figs. 16–18, 21). Metasoma and telson sparsely hirsute, macrosetae moderately short in male, straight and reddish to black; metasomal segments I–II with 10 carinae, III with 8 carinae, IV with 6–8 carinae, V with 2 carinae; segments I–III with well-defined, granulate carinae; segment IV with weakly indicated dorsolateral carinae; segment V with strong, granulate to dentate-lobate ventrolateral carinae; segments I–IV with dense granulation on all intercarinal surfaces including dorsal surfaces; 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.

AFFINITIES. The described features distinguish *N. haeckeli* sp. n. from all other species of the genus. According to the characters used in the key published in Kovařík et al. (2018), the new species is most similar to *N. amoudensis* Kovařík et al., 2018 and *N. gubanensis* Kovařík et al., 2018, which is also confirmed

by DNA phylogeny (paper in preparation). All examined specimens of *N. amoudensis* have pedipalp movable finger with 6 subrows of denticles (figs. 42 and 52 in Kovařík et al., 2018: 11) while all type specimens of *N. haeckeli* sp. n. have pedipalp movable finger with 5 of these subrows (Fig. 14). *N. gubanensis* could be characterized by the presence of a median lateral carina on metasoma III (figs 230 and 233 in Kovařík et al., 2018: 49). This carina is absent in *N. haeckeli* sp. n. (Fig. 16).

COMMENTS ON LOCALITIES AND LIFE STRATEGY. *N. haeckeli* sp. n. inhabits rocky mountain area in central Somaliland (Fig. 2). The types were collected at night in open terrain by UV detection together with *Parabuthus abyssinicus* Pocock, 1901, *Hottentotta polystictus* (Pocock, 1896), *Pandinurus* sp., and *Buthus* sp.

Neobuthus solegladi sp. n.

(Figures 27–70, Table 1)

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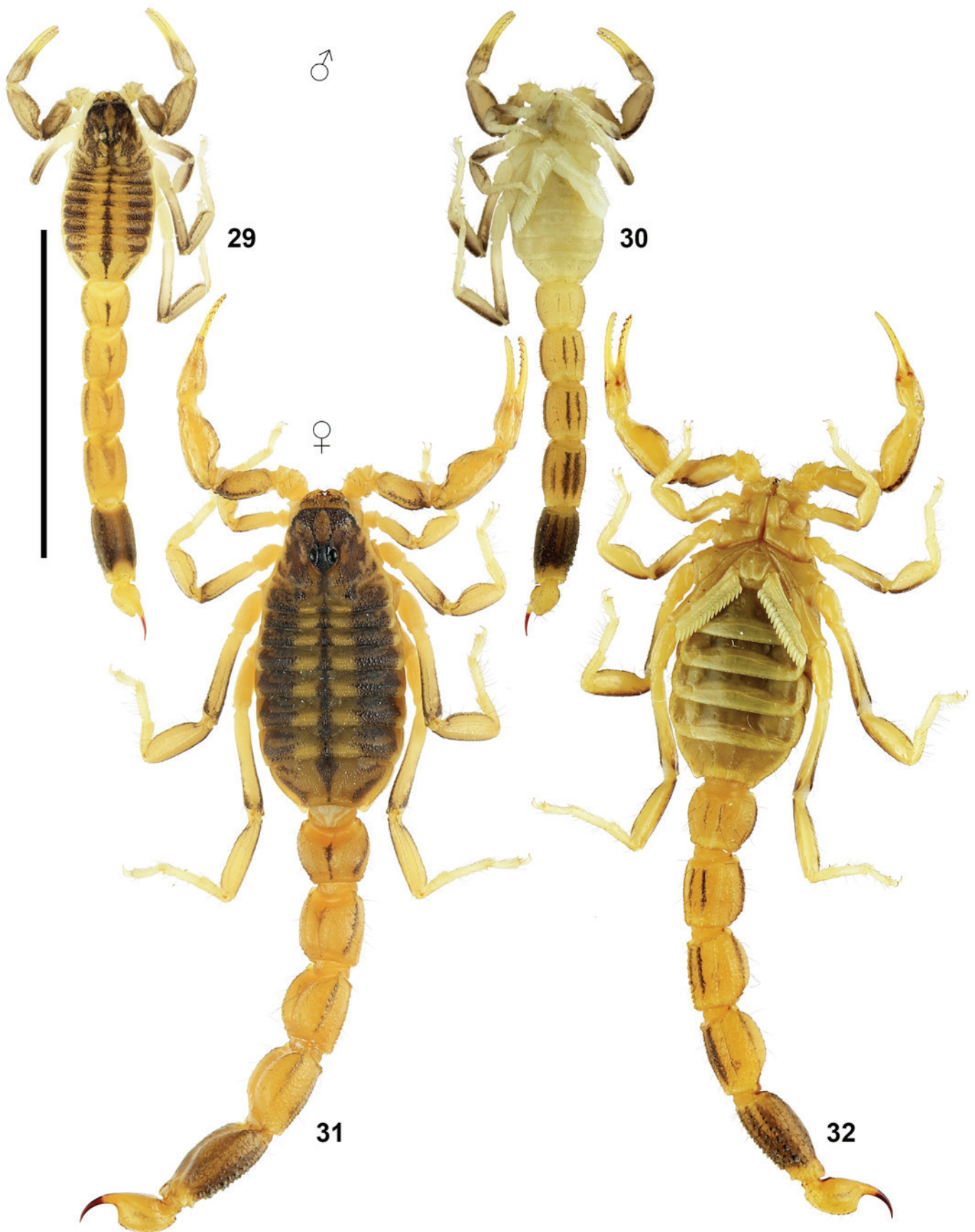
TYPE LOCALITY AND TYPE REPOSITORY. Somaliland, Agabar, 09°53'04.8"N 43°57'40.9"E, 982 m a. s. l.; FKCP.

TYPE MATERIAL. **Somaliland**, Agabar, 09°53'04.8"N 43°57'40.9"E, 982 m a. s. l. (Locality No. **19SO**), 9.VII.2019, 1♂ (holotype, 1717) 2♀ (paratypes), leg. F. Kovařík & T. Mazuch, FKCP.

ETYMOLOGY. The specific epithet honors Michael E. Soleglad (USA) for his friendship and lifelong dedication to scorpions.



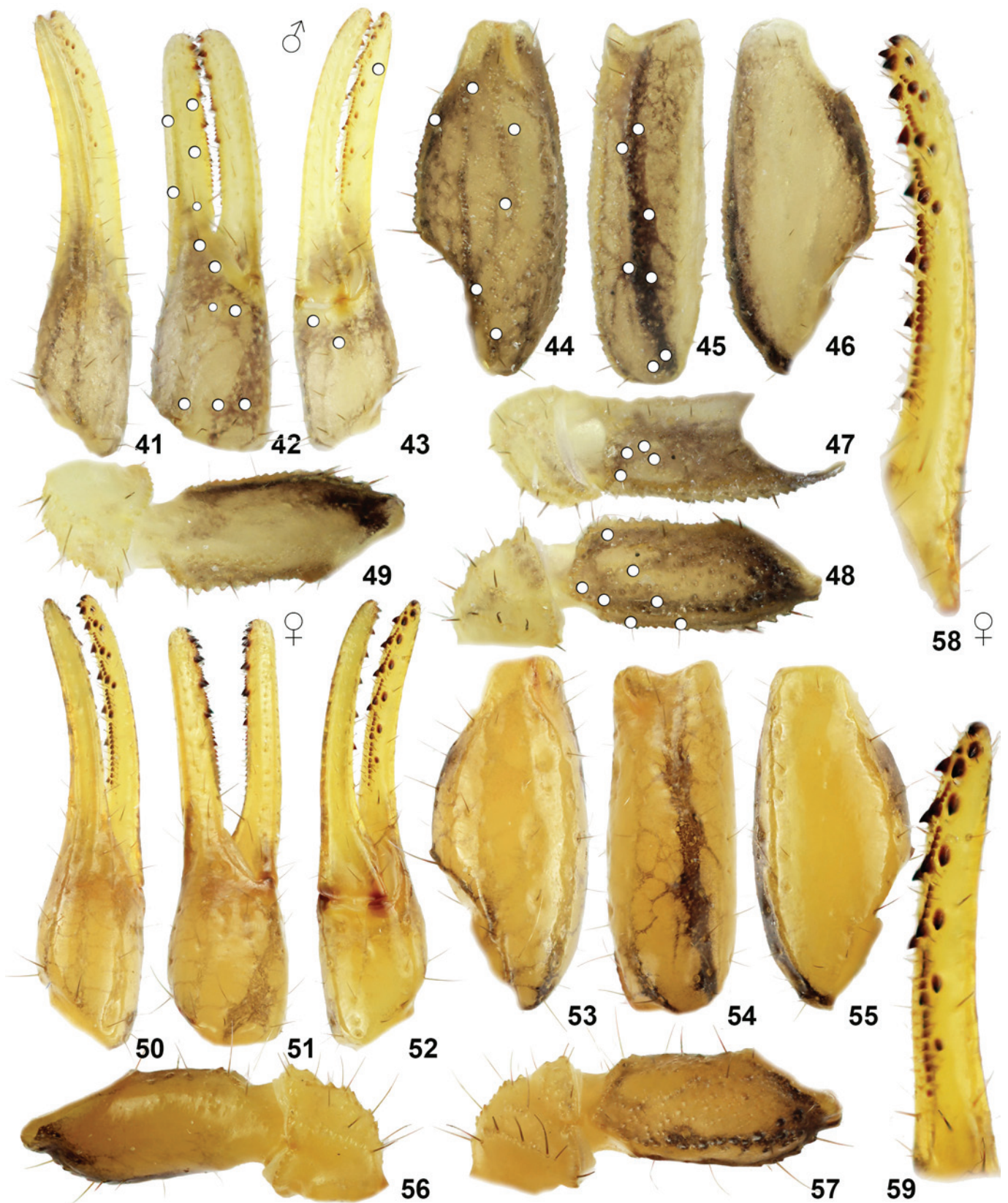
Figures 27–28. *Neobuthus solegladi* sp. n., holotype male (27) and paratype female (28) in vivo habitus.



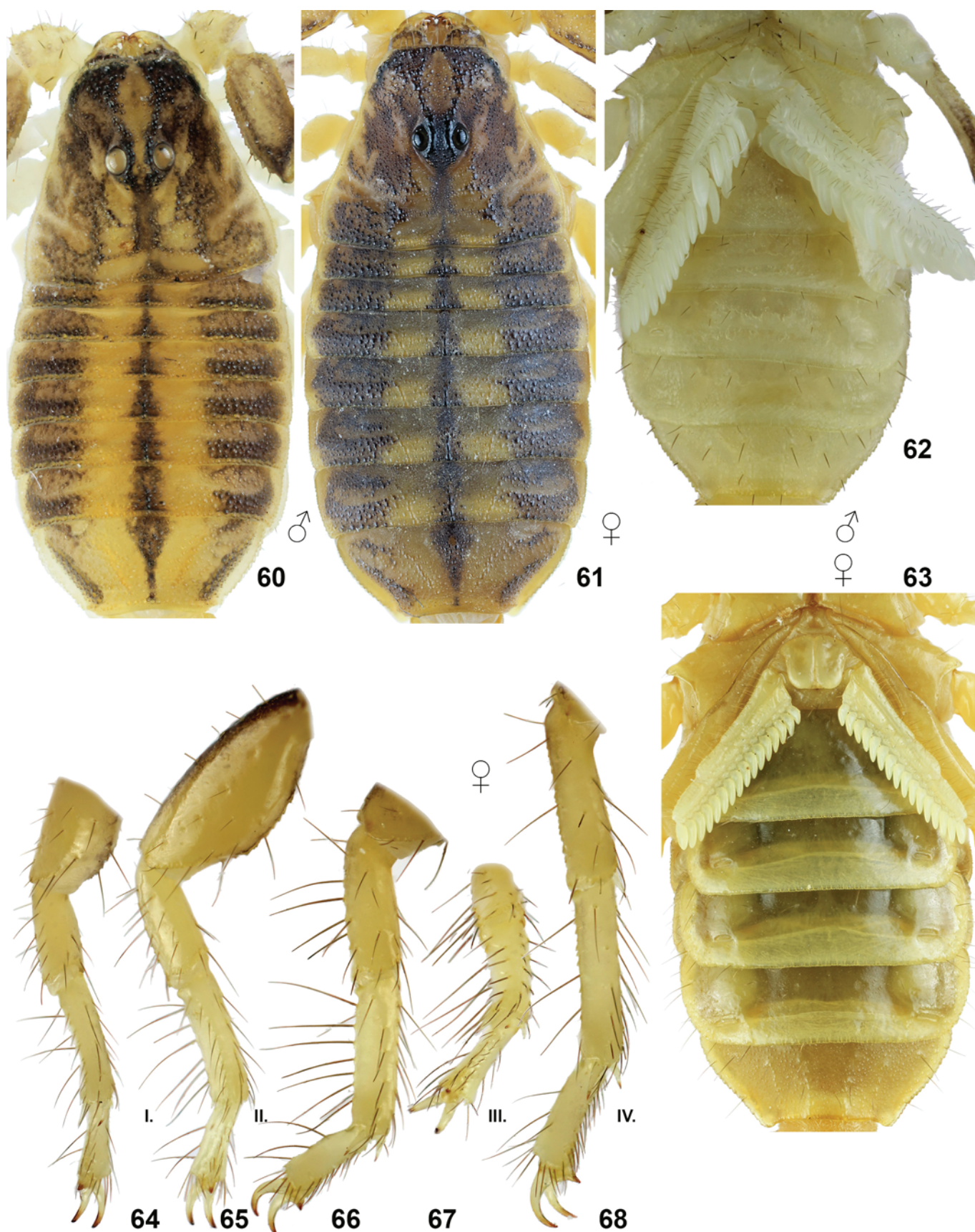
Figures 29–32: *Neobuthus solegladi* sp. n. **Figures 29–30.** Male holotype, dorsal (29) and ventral (30) views. **Figures 31–32.** Female paratype, dorsal (31) and ventral (32) views. Scale bar: 10 mm.



Figures 33–40: *Neobuthus solegladi* sp. n. **Figures. 33, 35–37.** Male holotype, telson lateral (33), metasoma and telson lateral (35), dorsal (36), and ventral (37) views. **Figures. 34, 38–40.** Female paratype, telson lateral (34), metasoma and telson lateral (38), dorsal (39), and ventral (40) views. Scale bars: 10 mm (35–37, 38–40).



Figures 41–59: *Neobuthus solegladi* sp. n., pedipalp. **Figures 41–49:** Male holotype, chela dorsal (41), external (42), and ventral (43) views, patella dorsal (44), external (45) and ventral (46) views, femur and trochanter internal (47), dorsal (48), and ventral (49) views. **Figures 50–59.** Female paratype, chela dorsal (50), external (51), and ventral (52) views, patella dorsal (53), external (54) and ventral (55) views, femur and trochanter ventral (56) and dorsal (57) views, movable (58) and fixed (59) finger dentate margin. The trichobothrial pattern is indicated in Figures 42–48 (white circles).



Figures 60–68: *Neobuthus solegladi* sp. n. **Figures 60, 62:** Male holotype, carapace and tergites (60), coxosternal area and sternites (62). **Figures 61, 63–68:** Female paratype, carapace and tergites (61), coxosternal area and sternites (63), and right legs I–IV, retrolateral aspect (64–68).



Figure 69. *Neobuthus solegladi* sp. n., type locality.

DIAGNOSIS. Total length 17.7 mm (male), 22–25.7 mm (females); carapace with area between anterior median carinae yellow to orange brown; tergites with 3 dark stripes, median stripe flanked on either side by broad longitudinal yellow bands; pedipalp relatively slender, male with femur L/W 2.36, patella L/W 2.28, chela L/W 4.27; chela movable finger with 5 subrows of primary denticles, 3–4 external accessory denticles flanking proximal end of each subrow; trichobothria d_2 present on dorsal surface of femur and patella; dorsoexternal and ventroexternal carinae on pedipalp patella in female reduced; posterior margins of tergites usually with 3 pairs of macrosetae; pedipalps, legs, metasoma and telson with moderately short, not spiniform macrosetae in males, and long, fine setae in females; males with sternites III–VI with fine granulation, sternite VII finely granulated with 4, granulated carinae; females with sternites III–VI almost smooth, sternite VII finely granulated with 4 weak granulated carinae; metasoma I–III with median lateral and dorsal carinae present in both sexes; lateral surface of metasoma V granulated in both sexes, with granules separated; soles of telotarsi with relatively sparse setation, leg III of adults with 9–13 ventral macrosetae on telotarsus; pectine teeth: 18–20 (male), 15–16 (females).

DESCRIPTION. Total length of adult male 17.7 mm, of adult females 22–25.7 mm; measurements of carapace, telson, segments of metasoma and pedipalps given in Table 1; positions and distribution of trichobothria of pedipalps shown

in Figs. 42–48; trichobothrium d_2 present on pedipalp femur and patella; base color pale 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; sternites smooth in females and granulated in male; macrosetae on pedipalps, legs, metasoma and telson much longer and finer in females than males; other sex differences cited below.

Pedipalp (Figs. 41–59). 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 in females; dorsoexternal carinae on pedipalp patella in female reduced to absent; chela with carinae present but smooth in females; chela movable finger with 5 and fixed finger with 4–5 subrows of primary denticles, 3–4 external accessory denticles flanking proximal end of each subrow.

Carapace (Figs. 60–61). Strongly trapezoidal (narrower anteriorly), wider than long (L/ W 0.85–0.89); posterior median postocular area flat, anterior median preocular area gently sloped downwards towards anterior margin; lateral

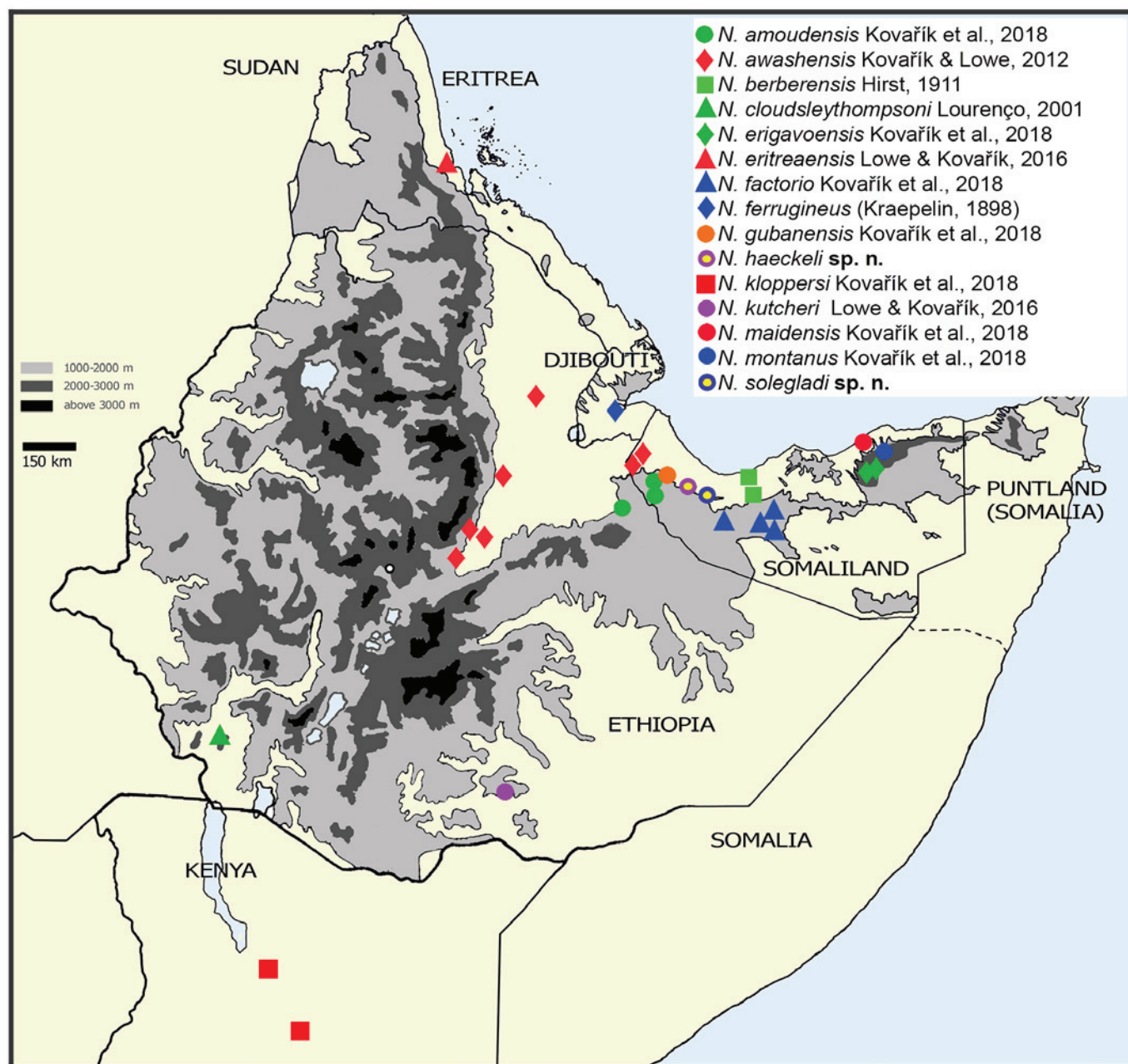


Figure 70: Map showing distribution of *Neobuthus* spp.

flanks steeply sloped; ocular tubercle broad, prominent, located slightly anterior to middle of carapace; anterior margin straight, finely microdenticulate, with coarser granules overlapping edge, bearing 8–10 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. 60–63). 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 almost smooth in females, 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 a half of sternite V in male and around a half of sternite IV in female; pectine teeth 18–20 in male, 15–16 (1x 15, 3 x 16) 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. 64–68). 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, 9–13 macrosetae on telotarsus III; moderate tibial spurs present on leg IV and reduced on leg. III.

Metasoma and telson (Figs. 33–40). Metasoma and telson sparsely hirsute, macrosetae moderately short in male and longer in female, straight and reddish to black; metasomal segments I–III with 10 carinae, IV with 8 carinae, V with 2 carinae; all carinae relatively well developed; segment IV with weakly indicated dorsolateral carinae; segment V with strong, granulate to dentate-lobate ventrolateral carinae; segments I–IV with dense granulation on all intercarinal surfaces except dorsal surfaces which are sparsely granulated, mainly in females; 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.

AFFINITIES. The described features distinguish *N. solegladi* sp. n. from all other species of the genus. According to the characters used in the key published in Kovařík et al. (2018), the new species is most similar to *N. gubanensis* Kovařík et al., 2018, which is also confirmed by DNA phylogeny (paper in preparation). Morphologically, it is difficult to distinguish these two species based on single specimens but we can see that female of *N. solegladi* sp. n. has smooth carinae on pedipalp chela (Fig. 50), which are absent in the females of *N. gubanensis* (fig. 246 in Kovařík et al., 2018: 50).

COMMENTS ON LOCALITIES AND LIFE STRATEGY. *N. solegladi* sp. n. inhabits rocky mountain area in central Somaliland. The types were collected at night in open terrain by UV detection together with *Parabuthus somalilandus* Kovařík et al., 2019, *Hottentotta polystictus* (Pocock, 1896), *Pandinurus* sp., and *Hemiscorpius* sp.

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References

- HIRST, S. 1911. Descriptions of new scorpions. *Annals and Magazine of Natural History*, 8(8): 462–473.
- KOVAŘÍK, F. 2009. *Illustrated catalog of scorpions. Part I. Introductory remarks; keys to families and genera; subfamily Scorpioninae with keys to Heterometrus and Pandinus species*. Prague: Clairon Production, 170 pp.
- KOVAŘÍK, F. & G. LOWE. 2012. Review of the genus *Neobuthus* Hirst, 1911 with description of a new species from Ethiopia (Scorpiones: Buthidae). *Euscorpius*, 138: 1–25.
- KOVAŘÍK, F., G. LOWE, A. I. AWALE, H. SH A. ELMI & A. A. HURE. 2018. Scorpions of the Horn of Africa (Arachnida, Scorpiones). Part XVII. Revision of *Neobuthus*, with description of seven new species from Ethiopia, Kenya and Somaliland (Buthidae). *Euscorpius*, 271: 1–82.
- KOVAŘÍK, F., G. LOWE, J. PLÍŠKOVÁ & F. ŠTÁHLAVSKÝ. 2013. A new scorpion genus, *Gint* gen. n., from the Horn of Africa (Scorpiones, Buthidae). *Euscorpius*, 173: 1–19.
- KOVAŘÍK, F., G. LOWE, M. SEITER, J. PLÍŠKOVÁ & F. ŠTÁHLAVSKÝ. 2015. Scorpions of Ethiopia (Arachnida: Scorpiones). Part II. Genus *Babycurus* Karsch, 1886 (Buthidae), with description of two new species. *Euscorpius*, 196: 1–31.
- KOVAŘÍK, F. & A. A. OJANGUREN AFFILASTRO. 2013. *Illustrated catalog of scorpions Part II. Bothriuridae; Chaerilidae; Buthidae I., genera Compsobuthus, Hottentotta, Isometrus, Lychas, and Sassanidotus*. Prague: Clairon Production, 400 pp.
- LOWE, G. & F. KOVAŘÍK. 2016. Scorpions of the Horn of Africa (Arachnida, Scorpiones). Part V. Two new species of *Neobuthus* Hirst, 1911 (Buthidae), from Ethiopia and Eritrea. *Euscorpius*, 224: 1–46.
- SISSOM, W.D., G.A. POLIS & D.D. WATT. 1990. Field and laboratory methods. Chapter 11 in: Polis, G.A. (ed.). *The Biology of Scorpions*. Stanford, CA: Stanford University Press.

- SOLEGLAD, M. E. & V. FET 2003. The scorpion sternum: structure and phylogeny (Scorpiones: Orthosterni). *Euscorpius*, 5: 1–34.
- STAHNKE, H. L. 1971. Scorpion nomenclature and mensuration. *Entomological News*, 81: 297–316.
- VACHON, M. 1963. De l'utilité, en systématique, d'une nomenclature des dents de chélicères chez les scorpions. *Bulletin du Muséum National d'Histoire Naturelle, Paris*, (2), 35 (2): 161–166.
- VACHON, M. 1974. Étude des caractères utilisés pour classe les familles et les genre de Scorpiones (Arachnides). 1. La trichobothriotaxie en Arachnologie. Sigles trichobothriaux et types de trichobothriotaxie chez les scorpions. *Bulletin du Muséum National d'Histoire Naturelle Paris, Zoologie*, (3) 104 (140): 857–958.
- VACHON, M. 1975. Sur l'utilisation de la trichobothriotaxie du bras des pedipalps des Scorpions (Arachnides) dans le classement des genres de famille des Buthidae Simon. *Compte rendus hebdomadaires des séances de l'Academie des Sciences, Paris Ser.D Sciences Naturelles*, 281 (21): 1597–1599.