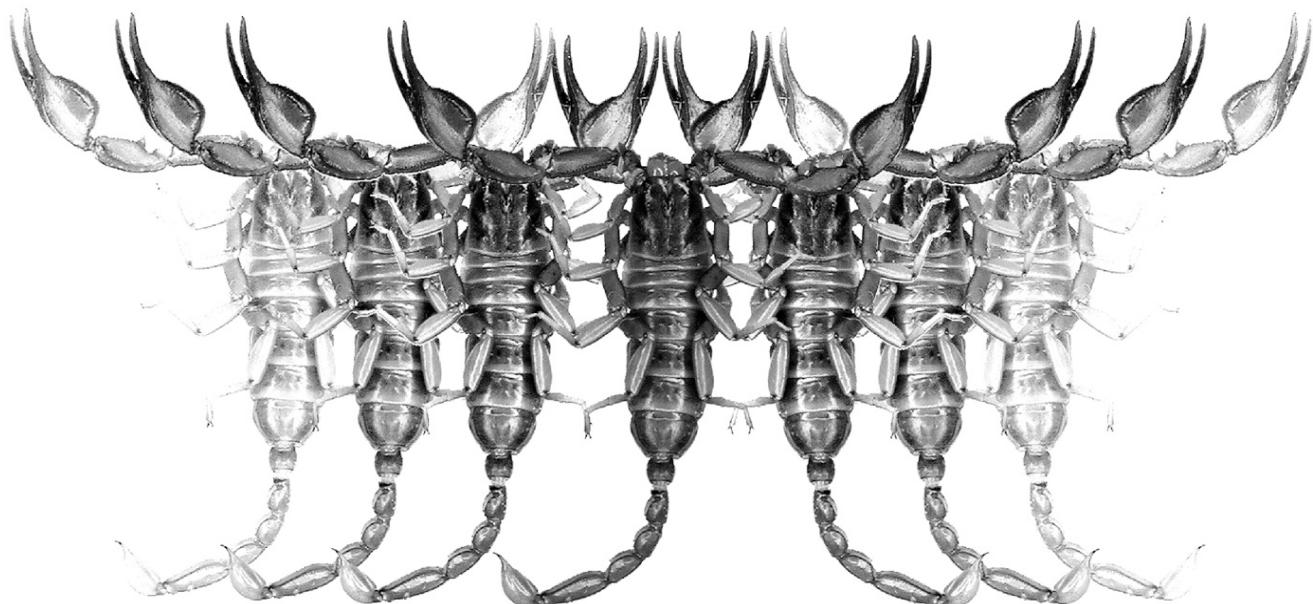


Euscorpius

Occasional Publications in Scorpiology



**Scorpions of the Horn of Africa (Arachnida: Scorpiones).
Part XXV. Description of *Pandinurus awalei* sp. n.
and the male of *Pandiborellius somalilandus* (Kovařík, 2012),
with remarks on recent synonymies
(Scorpionidae: Pandininae)**

František Kovařík, Graeme Lowe & Hassan Sh Abdirahman Elmi

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Euscorpius

Occasional Publications in Scorpiology

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Scorpions of the Horn of Africa (Arachnida: Scorpiones).
Part XXV. Description of *Pandinurus awalei* sp. n.
and the male of *Pandiborellius somalilandus* (Kovařík, 2012),
with remarks on recent synonymies (Scorpionidae: Pandininae)

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<http://zoobank.org/urn:lsid:zoobank.org:pub:634A674E-E08C-42DB-96E0-F6E5416D71CC>

Summary

A new species *Pandinurus awalei* sp. n. is described from Somaliland. The male of *Pandiborellius somalilandus* (Kovařík, 2012) is also described for the first time and sexual dimorphism of the species is defined. The habitus, morphology and habitats of both species are illustrated in detail with color and UV fluorescence images, including both live and preserved specimens. The species *Pandinurus intermedius* (Borelli, 1919) and *Pandipalpus lowei* (Kovařík, 2012) of Pandininae that were synonymized by Prendini & Loria (2020) are reinstated as valid species.

Introduction

Two of the authors (F.K. and H.E.) had an opportunity to participate in zoological expeditions to Somaliland in 2018 and 2019, and collected new specimens of scorpions belonging to the scorpionid subfamily Pandininae Thorell, 1876. We report from this material a new species, *Pandinurus awalei* sp. n., and also the discovery of the adult male of *Pandiborellius somalilandus* (Kovařík, 2012), previously unknown to science. Special interest attaches to the latter due to its importance for understanding the relationship between the genera *Pandiborellius* Rossi, 2015 and *Pandinurus* Fet, 1997. We also discuss and reverse two synonymies that were recently declared in this subfamily without justification by supporting data (Prendini & Loria, 2020).

Methods, Material & Abbreviations

Nomenclature and measurements follow Stahnke (1971), Kovařík (2009), and Kovařík & Ojanguren Affilastro (2013), except for trichobothriotaxy (Vachon, 1974 and figs. 206–212 in Kovařík et al., 2017c: 44). Hemispermatophore terminology follows Monod et al., 2017, except: stem = trunk, lateral = convex, contralateral = concave.

Specimens used for this study were collected and imported with permissions from the Amoud and Hargeisa Universities and the Ministry of the Environment of the Republic of Somaliland. Specimens studied herein were preserved in 80% ethanol, or are maintained in live culture in the first author's collection (FKCP). *Specimen depository:* 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

Family Scorpionidae Latreille, 1802

Subfamily Pandininae Thorell, 1876

Pandiborellius somalilandus (Kovařík, 2012)

(Figures 1–22, 82, Table 1)

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Pandinus (Pandinurus) somalilandus Kovařík, 2012: 9–13, 17–20, figs. 29–37, 59, 64; Prendini, 2016: 52.

Pandinurus (Pandiborellius) somalilandus: Rossi, 2015: 35.

Pandiborellius somalilandus: Kovařík et al., 2017c: 35–39, figs. 136–137, 192, 396.



1



2

Figures 1–2. *Pandiborellius somalilandus*, female (1) from locality No. 18SL (2) in vivo habitus.



Figures 3–4. *Pandiborellius somalilandus*, male from locality No. 19SL in dorsal (3) and ventral (4) views.

TYPE LOCALITY AND TYPE REPOSITORY. **Somaliland**, 25 km N of Sheikh, 10°02.001'N 45°09.589'E, 763 m a. s. l.; FKCP.

TYPE MATERIAL EXAMINED. **Somaliland**, 25 km N of Sheikh, 10°02.001'N 45°09.589'E, 763 m a. s. l. (fig. 37 in Kovařík, 2012: 11), 1♀ (gravid, holotype, figs. 136–137, 192 in Kovařík et al.,

2017c: 35–39, and figs. 29–34, 36, 59 in Kovařík, 2012: 10–11, 18), XI.2010, leg. T. Mazuch and P. Novák, FKCP; 70 km from Berbera to Hargeisa, 1♀ (paratype), XI.2010, leg. T. Mazuch and P. Novák; near Sheikh, foothills of Goolis Mts., 09°59.881'N 45°09.762'E, 896 m a. s. l. (fig. 35 in Kovařík, 2012: 11), 1juvenile (paratype), XI.2010, leg. T. Mazuch, FKCP.

Dimensions (mm)		<i>Pandiborelius somalilandus</i> ♂	<i>Pandinurus awalei</i> sp. n. ♂ holotype	<i>Pandinurus awalei</i> sp. n. ♀ paratype
Carapace	L / W	17.94 / 17.49	15.51 / 15.41	15.55 / 15.47
Mesosoma	L	24.05	24.59	35.52
Tergite VII	L / W	6.85 / 14.14	7.30 / 12.95	7.49 / 12.63
Metasoma + telson	L	61.88	57.73	52.35
Segment I	L / W / D	7.99 / 7.68 / 5.91	6.99 / 6.73 / 5.48	6.55 / 6.76 / 5.16
Segment II	L / W / D	8.39 / 6.64 / 5.72	8.22 / 5.87 / 5.35	7.26 / 5.62 / 5.08
Segment III	L / W / D	9.27 / 6.07 / 5.82	8.65 / 5.11 / 5.20	7.87 / 5.13 / 5.10
Segment IV	L / W / D	10.09 / 5.68 / 5.67	9.58 / 4.48 / 4.91	8.78 / 4.63 / 4.58
Segment V	L / W / D	13.07 / 5.37 / 5.31	12.42 / 4.45 / 4.70	10.93 / 4.54 / 4.41
Telson	L / W / D	13.07 / 6.45 / 5.70	11.87 / 5.35 / 4.61	10.96 / 4.39 / 4.32
Pedipalp	L	52.48	51.05	50.34
Femur	L / W	12.14 / 6.31	11.73 / 5.58	11.49 / 5.32
Patella	L / W	13.04 / 7.24	12.56 / 5.79	12.85 / 6.06
Chela	L	27.30	26.76	26.00
Manus	W / D	14.45 / 8.61	14.26 / 6.55	14.21 / 7.01
Movable finger	L	17.76	16.67	16.06
Total	L	103.87	97.83	103.42

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

OTHER MATERIAL EXAMINED. **Somaliland**, between Berbera and Hargeisa, 09°57'48"N 44°42'33"E, 787 m a. s. l. (Locality No. 18SL, Fig. 2), 2.IX.2018, 1♀ (Fig. 1), leg. F. Kovařík and T. Mazuch, FKCP; between Borama and Rugi, 09°57'48"N 43°18'04.1"E, 1339 m a. s. l. (Locality No. 19SL), 7.VII.2019, 1♂ together with exuvia (No. 1754, Figs. 3–22, Table 1), leg. F. Kovařík and H. Sh A. Elmi, FKCP.

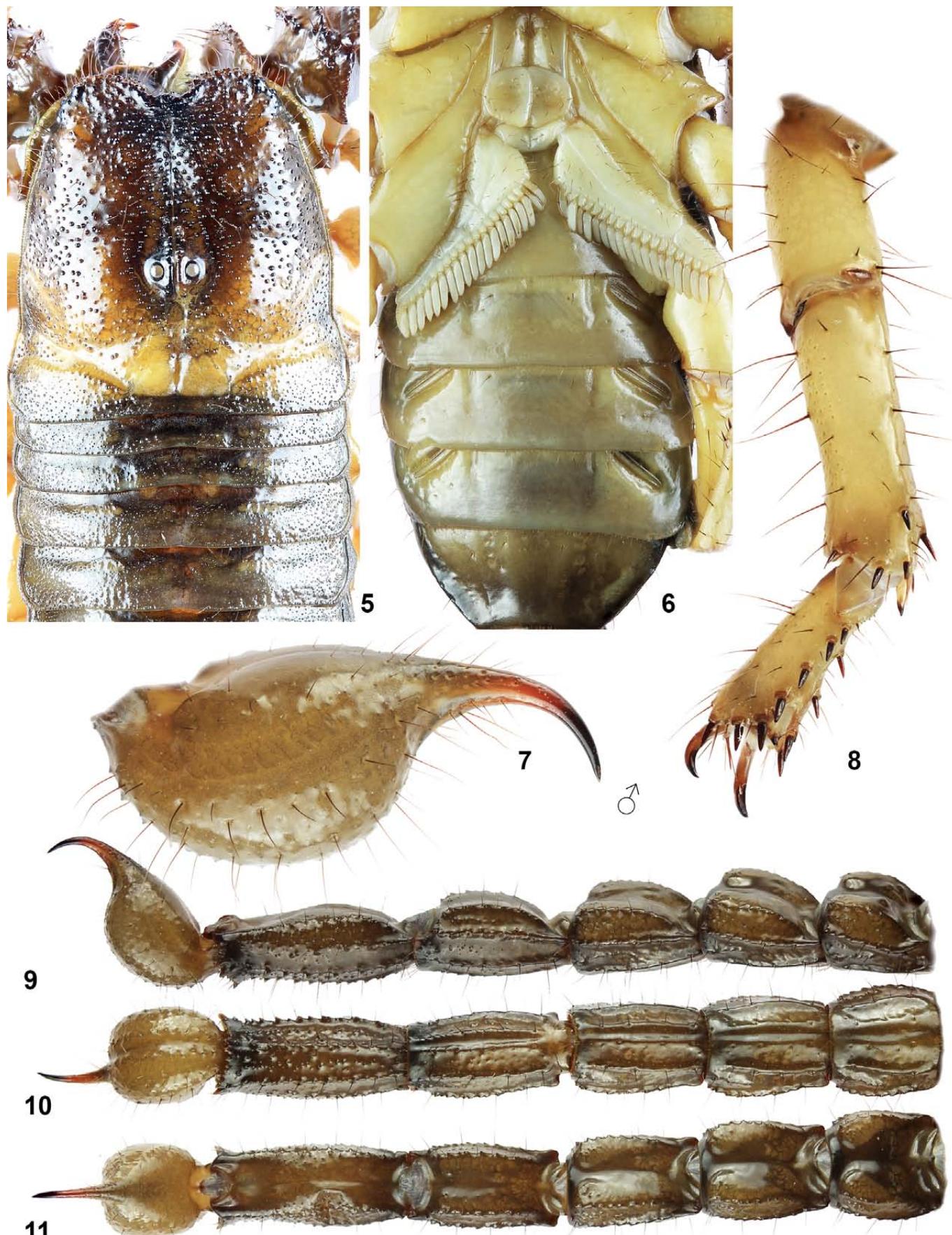
EMENDED DIAGNOSIS (♂♀). Total length 95–110 mm. Color uniformly reddish brown to black, legs yellow. Chelicerae brown, reticulate, with black fingers and anterior margins. Carapace lacking carinae and finely (♀) or coarsely (♂) granulated. External trichobothria on patella number 15 (5 eb, 3–4 esb, 2 em, 1–2 est, 3 et); ventral trichobothria on patella number 41–46; internal trichobothria on chela number 2, ventral trichobothria on chela number 10–11. Pedipalp chela densely hirsute. Pedipalp chela dorsally with evenly-sized conspicuous granules. Dorsoexternal surface of chela with four carinae indicated by rows of granules mainly in females. Chela internally with two longitudinal carinae covered by granules. Chela of male length/width ratio 1.89. Pectinal teeth number 19–20 in male, 19–23 in females. Dorsal carinae on first through fourth metasomal segments denticulate, usually with smooth (♀) or sharp (♂) denticles. Spiniform formula of tarsomere II = 6-7/5: 6-7/5: 7/5: 7/5. Tarsomere II with 3 spines on inclined anteroventral surface. Length to width ratio of metasoma V of male 2.43.

NOTE. For photos of the female holotype and photos of the type locality see figs. 29–37, 59 in Kovařík, 2012: 9–13, 17–20.

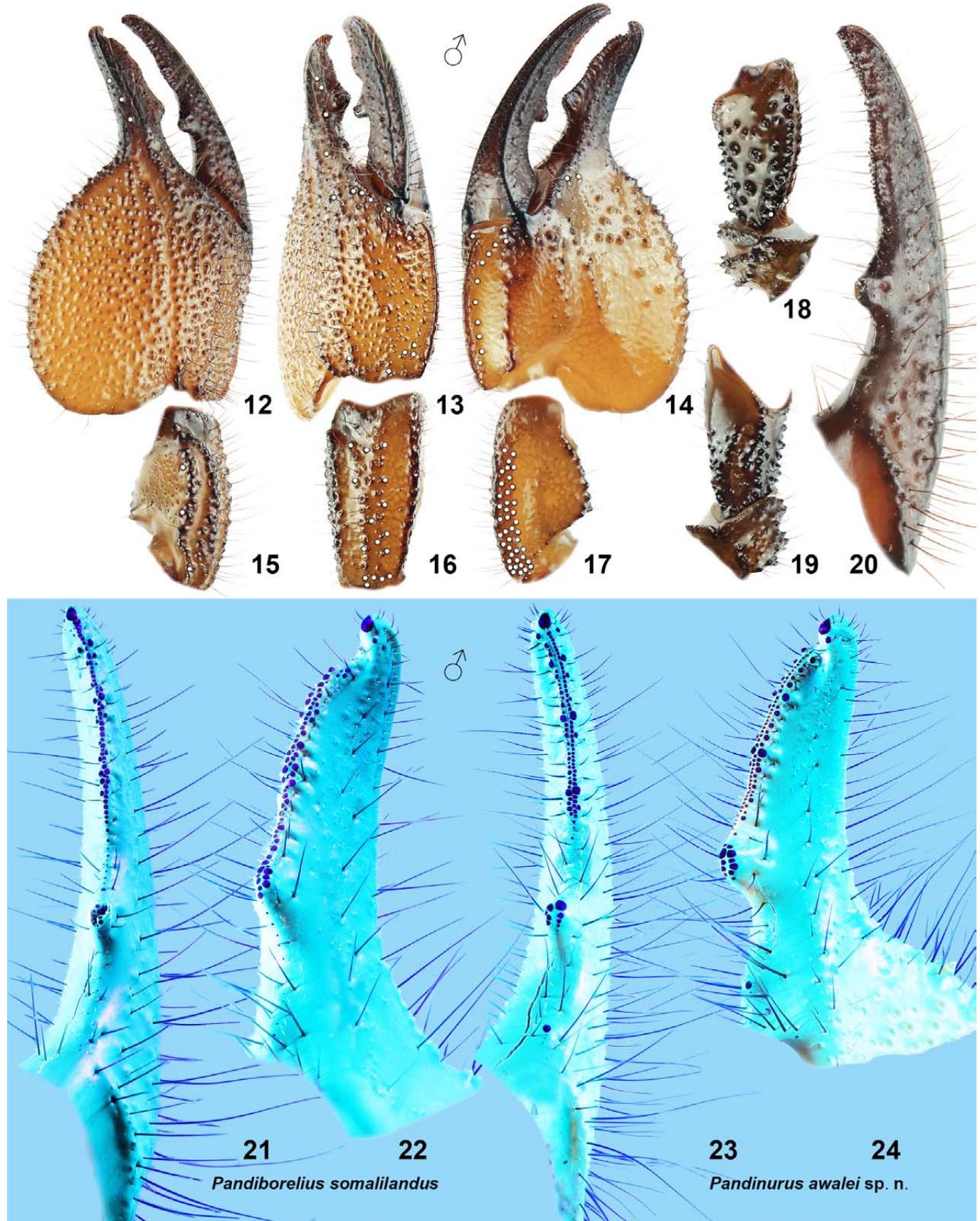
TAXONOMIC REMARKS. *P. somalilandus* was based solely on the holotype and paratype females. The male described herein is the first known male belonging to this species. Sexual dimorphism is one of the important characters in the taxonomy of Pandininae.

Kovařík et al. (2017c) defined three key morphological characters for differentiation of genera *Pandiborellius* Rossi, 2015 and *Pandinurus* Fet, 1997: (1) patella external surface with 3 or 4 trichobothria in est series in *Pandinurus* (Fig. 58 and figs. 194–203 in Kovařík et al., 2017c: 41) vs. 1 or 2 trichobothria in *Pandiborellius* (Fig. 16 and figs. 189–193 in Kovařík et al., 2017c: 41); (2) dentate margin of pedipalp chela fixed and movable fingers with distinct granules in two parallel rows present in anterior half of fingers in *Pandinurus* (Figs. 23–24) vs. dentate margin of pedipalp chela fixed and movable fingers with distinct granules in a row in *Pandiborellius* (Figs. 21–22); (3) male with more strongly pronounced lobate tooth on pedipalp movable finger than female in *Pandinurus* (figs. 144–167 in Kovařík et al., 2017c: 37) vs. male with usually slightly more pronounced lobate tooth on pedipalp movable finger than female in *Pandiborellius* (figs. 126–143 in Kovařík et al., 2017c: 37).

The herein described male of *Pandiborellius somalilandus* complies with the first two of these key characters for *Pandiborellius*. However, it possesses a more strongly pronounced tooth on the pedipalp movable finger than female (Figs. 62–64), a character previously used to diagnose *Pandinurus*. This condition can assist in differentiating *P. somalilandus* from all other known *Pandiborellius* species, but it demonstrates that this character cannot be used at the generic level.



Figures 5–11. *Pandiborellius somalilandus*, male from locality No. 19SL, carapace and tergites I–IV (5), coxosternal area and sternites (6), telson (7), left leg IV, retrolateral aspect (8), metasoma and telson in lateral (9), ventral (10), and dorsal (11) views. Scale bar: 10 mm (9–11).



Figures 12–24: Pedipalp segments. **Figures 12–22.** *Pandiborellius somalilandus*, male from locality No. 19SL, pedipalp chela dorsal (12), external (13) and ventral (14) views, patella dorsal (15), external (16) and ventral (17) views, femur and trochanter dorsal (18), and ventral (19) views, movable finger dentition under white (20) and UV (21) light and fixed finger (22) dentition under UV light. Trichobothrial pattern indicated in Figures 12–18. **Figures 23–24.** *Pandinurus awalei* sp. n., male holotype, movable finger (23) and fixed finger (24) dentition under UV light.

Pandinurus awalei sp. n.

(Figs. 23–76, 83, Table 1)

<http://zoobank.org/urn:lsid:zoobank.org:act:4080C8CB-FF9-4A2D-9B85-CCEE3849CA02>

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 (FKCP). **Somaliland**, Agabar, 09°53'04.8"N 43°57'40.9"E, 982 m a. s. l. (Locality No. 19SO, Fig. 53), 9.VII.2019, 1♂ (holotype, No. 1845, 5th, maturity ecdysis 27.II.2020, Figs. 25–28, 31, 33, 35–38, 40, 45–52, 62–63, 67–72), 1♀ (paratype, scorpion born 18.VII.2019, Figs. 29–30, 32, 34, 39, 41–44, 54–61, 64–66, 73–74), 1♀ (paratype still alive, ecdysis 14.IX.2019, maturity ecdysis 22.VIII.2020, Fig. 76), 1juv. (paratype), leg. F. Kovařík et T. Mazuch, 1♂ (paratype, born 18.VII.2019, 2nd ecdysis 19.–25.IX.2019, 3rd ecdysis 15.–22.XI.2019, 4th ecdysis 11.I.–20.II.2020, 5th, maturity ecdysis 11.VII.2020, Fig. 75), 7 juveniles or adult females (paratypes) after 5th ecdysis still alive (born 18.VII.2019, 2nd ecdysis 19.–25.IX.2019, 3rd ecdysis 15.–22.XI.2019, 4th ecdysis 11.I.–20.II.2020, 5th ecdysis 10.VI.–25.VIII.2020).

ETYMOLOGY. Named after Ahmed Ibrahim Awale, an ecologist from Somaliland, a university lecturer, chairman of Candlelight NGO, and co-founder and chairman of Somaliland Biodiversity Foundation. He is also the author of several scientific papers and books including *Environment in Crisis: Selected Essays on Somali Environment* (2016); and *Introduction to Plants in Central Somaliland* (the latter together with Helen Pickering, 2018).

DIAGNOSIS (♂♀). Total length 90–105 mm. Color uniformly reddish brown to black; legs yellow; chela orange to brown but yellow in young specimens; telson yellowish brown to black. Chelicerae yellowish brown, reticulate, with black fingers and anterior margin. Carapace lacking carinae but with sparse granules, anterior part smooth. External trichobothria on patella number 17–19 (5 eb, 4–6 esb, 2 em, 3 est, 3 et); ventral trichobothria on patella number 35–43; internal trichobothria on chela number 3, accessory external trichobothrium ea on chela absent, ventral trichobothria on chela number 11–13. Pedipalp densely hirsute, mainly on chela. Granules on dorsal surface of chela of pedipalp conical and rounded. Lobe of chela granulated with the same intensity as whole dorsal surface of chela. External surface of chela with granules and without carinae which could be indicated in females. Chela of male length/ width ratio 1.87. Pectine teeth 17–19 in both sexes. Dorsal carinae on second through fourth metasomal segments granulate by large pointed tooth. Spiniform formula of tarsomere II = 6-7/4: 6-7/4: 7/5: 7–8/5. Tarsomere II with 2 spines on inclined anteroventral surface. Length to width ratio of metasoma V of male 2.79.

DESCRIPTION. Habitus as shown in Figs. 25–26, 29–30. Total length 90–105 mm.

Coloration (Figs. 25–26, 29–30, 43–46, 73–76). Base color uniform reddish brown to black, young specimens more pale (Fig. 75). Legs yellow, pedipalp chela orange to brown but yellow in young specimens, and telson yellowish brown to black. Chelicerae yellowish brown, reticulate, with black fingers and anterior margin.

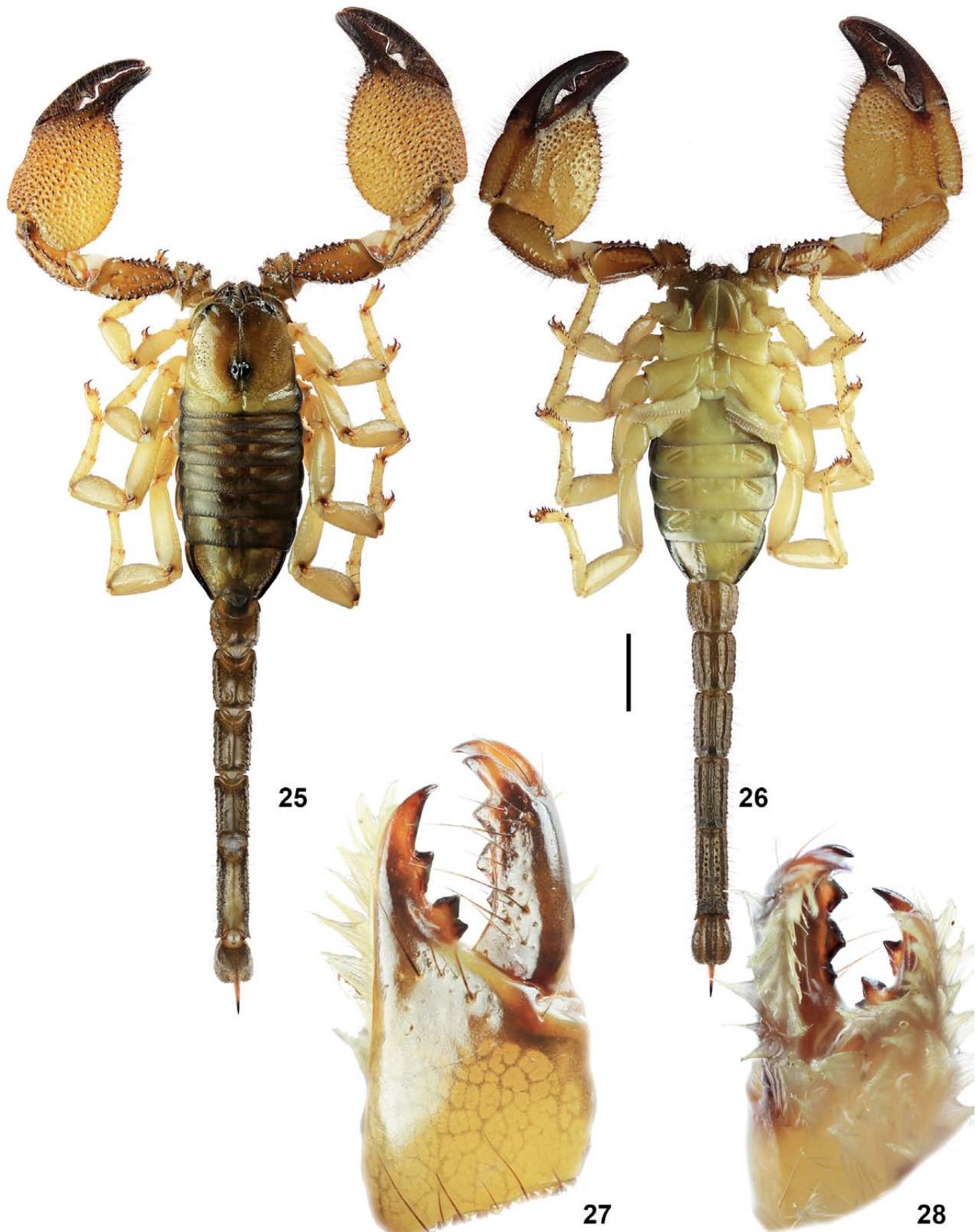
Pedipalps (Figs. 23–24, 48–52, 54–64). Pedipalps densely hirsute, mainly on the chela. Femur smooth with several large granules dorsally, and four carinae composed of several strong granules. Patella smooth and rugose externally, with four carinae. Granules on dorsoexternal surface of chela conical and rounded. Lobe of chela granulated with same intensity as whole dorsal surface of chela. Internal surface of chela granulated by conical usually pointed granules mainly in anterior part. Dentate margins of fixed and movable fingers of pedipalp with distinct granules in two parallel rows, present in anterior half of fingers. Posterior half of fingers almost without granules in male, with distinct granules in a row in female. *Trichobothriotaxy* (Figs. 54–59). External trichobothria on the patella number 17–19 (5 eb, 4–6 esb, 2 em, 3 est, 3 et); accessory external trichobothrium ea on chela absent, ventral trichobothria on patella number 35–43; internal trichobothria on chela number 3, ventral trichobothria on chela number 11–13.

Metasoma and telson (Figs. 40–47). Metasomal segments I–IV each with a total of 8 complete carinae of which the ventral on segments I–III are smooth. Other carinae sparsely granulated. Segment V with five carinae developed and granulated. Dorsal and lateral surfaces of the segments rugose with several granules, segments IV–V more granulated. Dorsal carinae on segments II–IV granulate with large pointed tooth. Entire surfaces of metasoma and telson hirsute with long setae. Telson smooth to rugose, bulbous, with aculeus shorter than vesicle.

Carapace and mesosoma (Figs. 31–34). Carapace smooth without carinae, sparsely covered by large granules medially and laterally, and finely granulated with small granules posteriorly mainly in the male. Anterior margin of carapace bilobate, strongly emarginate medially, bearing several macrosetae. Three lateral eyes present on each side. Tergites finely granulated in the male, almost smooth in the female. Pectinal tooth count 17–19 in both sexes. Pectine marginal tips extend to the anterior first quarter of sternite IV in the male, and anterior third quarter of sternite III in the female. Sternites smooth, without carinae, but with two longitudinal furrows.

Chelicerae (Figs. 27–28, 65–66). Movable finger dorsal margin with one large subdistal (sd) denticle; ventral margin smooth; ventral distal (vd) denticle longer than prominent dorsal (dd) denticle. Fixed finger with four denticles, median (m) and basal (b) denticles fused into bicusp; no ventral accessory denticles.

Legs (Figs. 35–39). All legs without distinct carinae, smooth. Tarsomeres hirsute, with setae and macrosetae. Spiniform formula of tarsomere II = 6-7/4: 6-7/4: 7/5: 7–8/5. Tarsomere II with 2 spines on inclined anteroventral surface but there could be an additional spiniform seta on external margin indicated by another not well developed spina.



Figures 25–28. *Pandinurus awalei* sp. n., male holotype, dorsal (25) and ventral (26) views, and right chelicera in dorsal (27) and ventral (28) aspects. Scale bar: 10 mm (25–26).

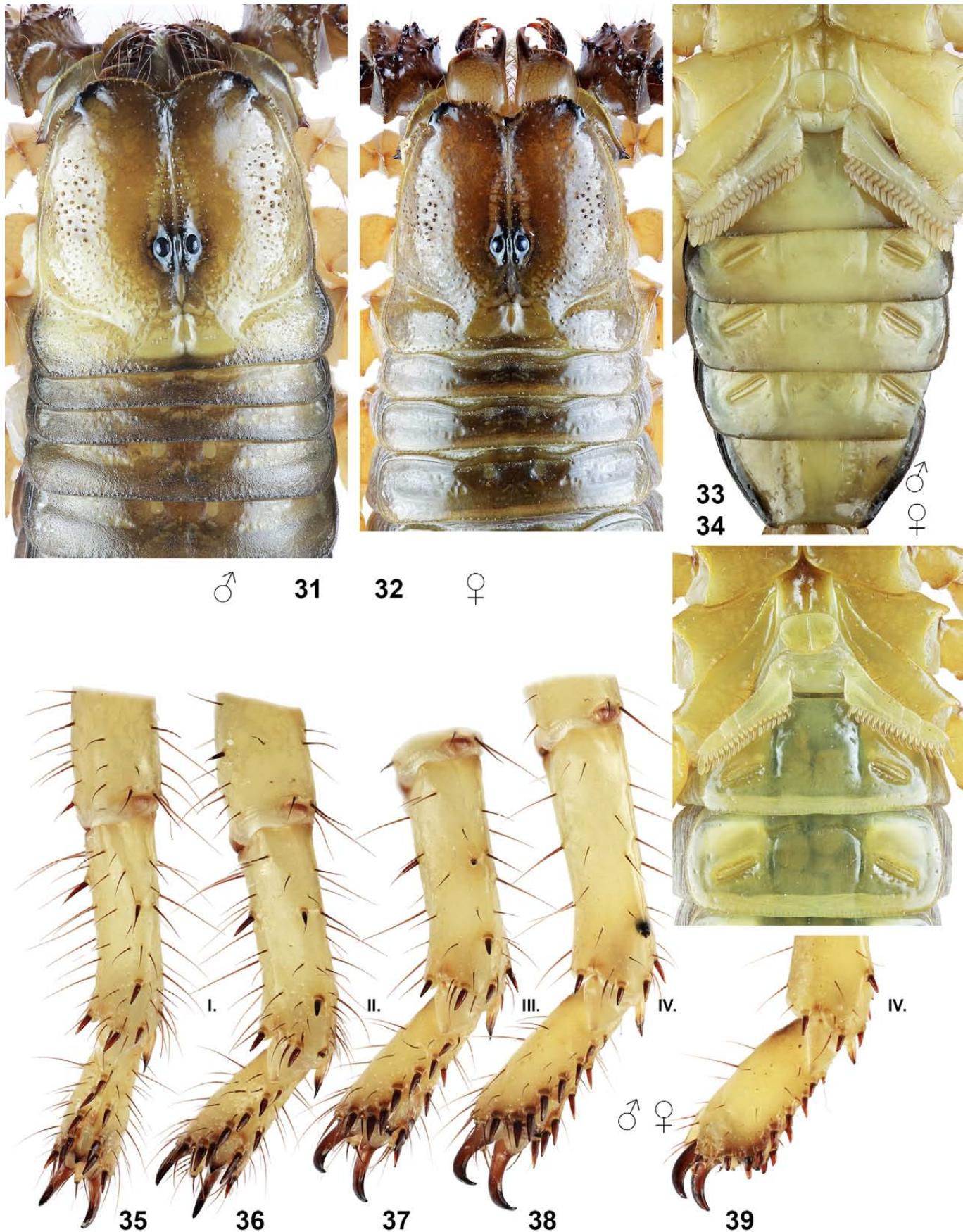


Figures 29–30. *Pandinurus awalei* sp. n., female paratype in dorsal (29) and ventral (30) views. Scale bar: 10 mm.

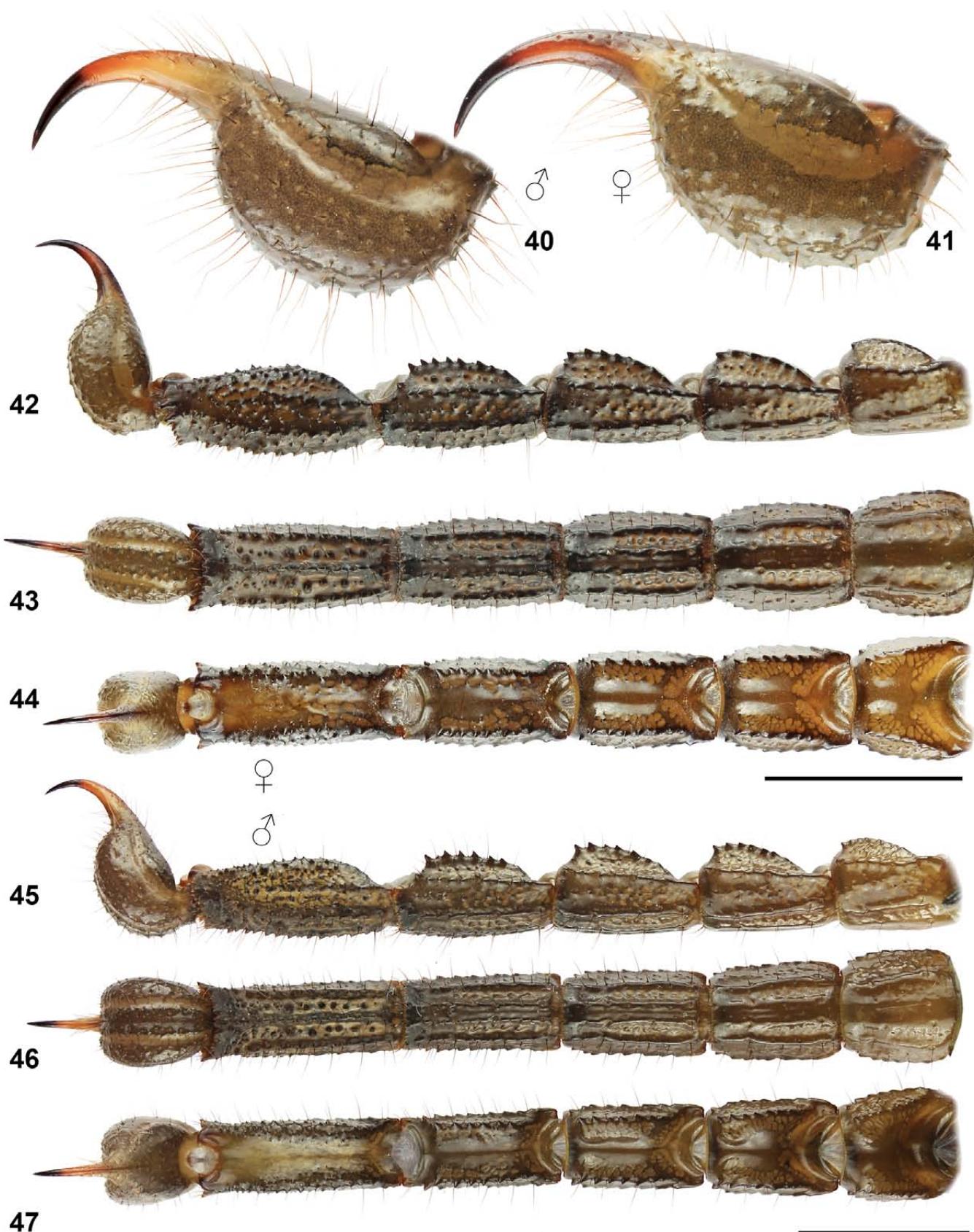
Hemispermatophore. (Figs. 67–72). Lamelliform. Distal lamina long, with robust hook on anterior margin near base. Lamina constricted immediately distal to hook, but gradually widening more distally. Apex of lamina with sharp posterior deflection at ca. 70° angle relative to proximal axis, tapering to a narrow, slightly bent tip. Portion of distal lamina proximal to hook with broad, shallow trough on convex side. Truncal flexure, tectum, hemisolenos and clasper strongly developed. Trunk relatively short, ca. half of length of distal lamina, gradually tapered towards base, with weakly sclerotized diagonal axial rib. Proximal 2/3 of axial rib running along posterior margin of

trunk. Both left and right hemispermatophores displayed similar morphology. Measurements of left hemispermatophore (mm): distal lamina: total length from truncal flexure 9.90; length from truncal flexure to base of hook 2.39; length from base of hook to apical deflection 6.37; width immediately proximal to hook 0.97, immediately distal to hook 0.69; width at apical deflection 1.03. Trunk: length 3.47; distal width 1.47, basal width 0.77. Pedicel: length 1.91. Morphometric ratios: distal lamina total length/trunk length 2.85; distal lamina proximal to hook length/distal to hook length 3.08.

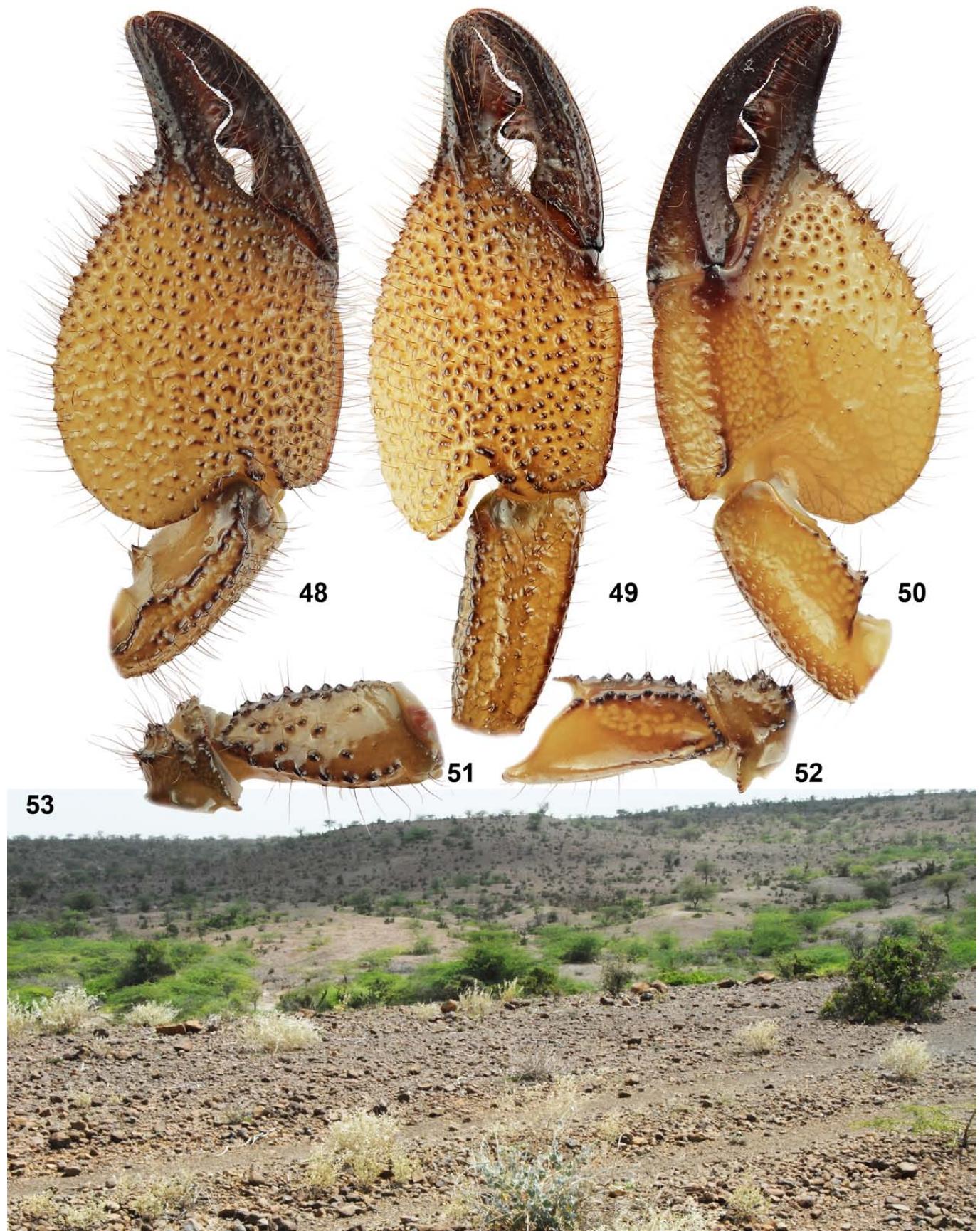
Measurements. See Table 1.



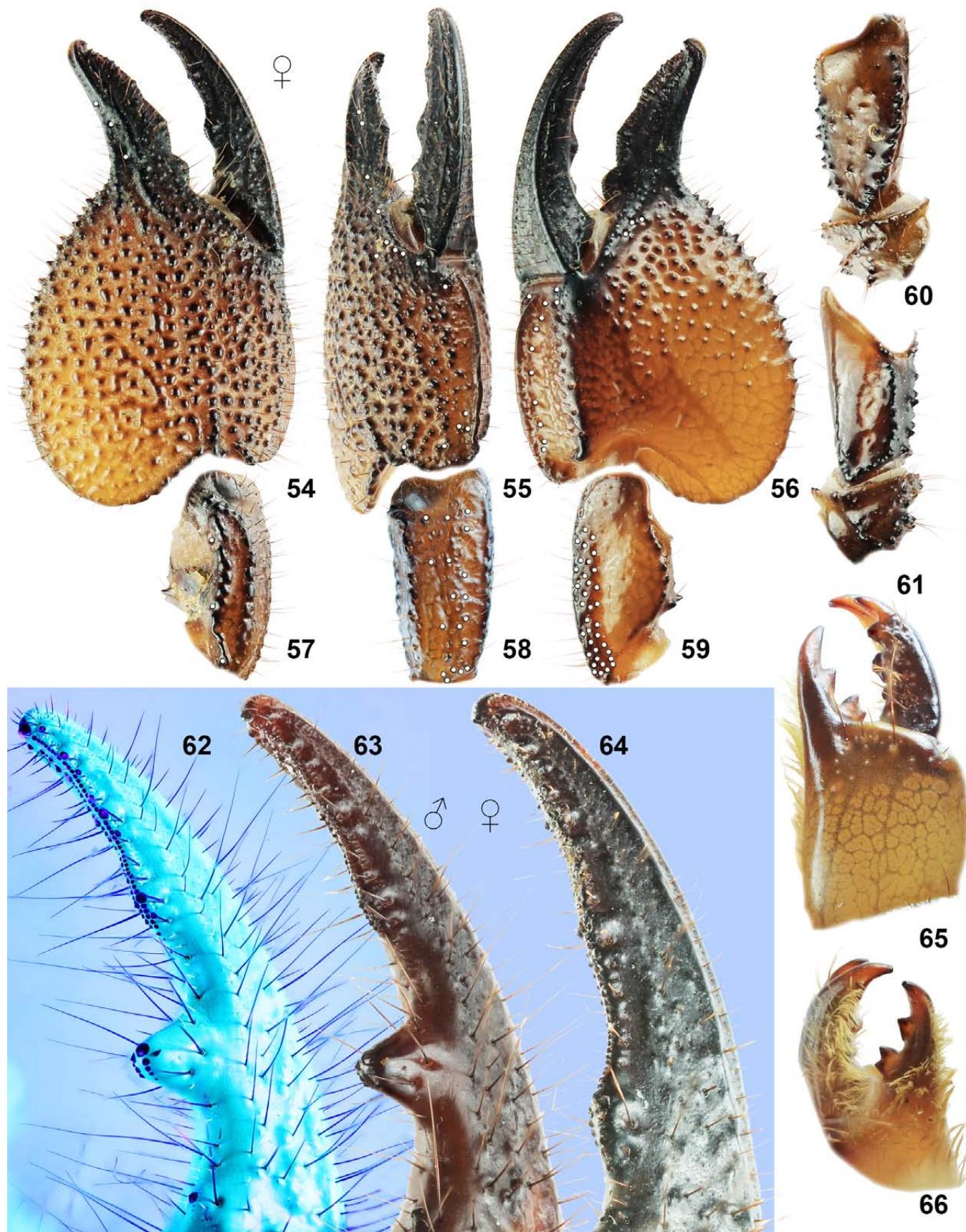
Figures 31–39. *Pandinurus awalei* sp. n. **Figures 31, 33, 35–38.** Male holotype, carapace and tergites I–IV (31), coxosternal area and sternites (33), and left legs I–IV, retrolateral aspect (35–38). **Figures 32, 34, and 39.** Female paratype, carapace and tergites I–III (32), coxosternal area and sternites III–IV (34), and left leg IV, retrolateral aspect (39).



Figures 40–47: *Pandinurus awalei* sp. n. **Figures 40, 45–47.** Male holotype, telson lateral (40), and metasoma and telson lateral (45), ventral (46), and dorsal (47) views. **Figures 41–44.** Paratype female, telson lateral (41), and metasoma and telson lateral (42), ventral (43), and dorsal (44) views. Scale bars: 10 mm (42–44, 45–47).



Figures 48–52: *Pandinurus awalei* sp. n. **Figures 48–52.** Male holotype, pedipalp chela and patella dorsal (48), external (49) and ventral (50) views, femur and trochanter dorsal (51), and ventral (52) views. **Figure 53.** Type locality



Figures 54–66: *Pandinurus awalei* sp. n. **Figures 54–61, 64–66.** Female paratype, pedipalp chela dorsal (54), external (55) and ventral (56) views, patella dorsal (57), external (58) and ventral (59) views, femur and trochanter dorsal (60), and ventral (61) views, movable finger dentition under white light (64); right chelicera dorsal (65) and ventral (66) aspects. Trichobothrial pattern indicated in Figures 54–59. **Figures 62–63.** Male holotype, movable finger dentition under UV (62) and white (63) light.



Figures 67–69. *Pandinurus awalei* sp. n., left whole hemispermatophore, anterior (67), posterior-concave (68) and convex (69) views. Scale bar: 4 mm.



Figures 70–72. *Pandinurus awalei* sp. n., left hemispermophore, capsule, anterior (70), concave (71) and convex (72) views. Scale bar: 1 mm.

REMARKS. Overall structure of the hemispermophore of *Pandinurus awalei* sp. n. is quite similar to those recorded for seven other *Pandinurus* spp. (Kovařík et al., 2017c), which also have a long, narrow distal lamina that is sharply deflected at its apex, and a short trunk.

AFFINITIES. *Pandinurus awalei* sp. n. is reliably distinguished from all other *Pandinurus* species by the following unique combination of characters: accessory external trichobothrium *ea* on pedipalp chela absent; granules on dorsal surface of chela of pedipalp conical and rounded, not pointed; legs yellow; pedipalp chela densely hirsute; pedipalp chela of male length/ width ratio 1.87; spiniform formula of tarsomere II = 6-7/4: 6-7/4: 7/5: 7-8/5.

The type locality of *Pandinurus awalei* sp. n. is relatively close to known areas of distribution of *P. hangarale* Kovařík et al., 2017, *P. kmoniceki* Kovařík et al., 2017, and *P. phillipsi* (Pocock, 1896). These other species differ as

follows: *P. hangarale* has the whole body including legs dark (figs. 22–23 in Kovařík et al., 2017a: 7) and has male pedipalp chela length/ width ratio of 1.59; *P. kmoniceki* and *P. phillipsi* have accessory external trichobothrium *ea* on the chela present and located between trichobothria *esb* and *eb* on the base of the fixed finger (fig. 6 in Kovařík et al., 2017b: 4), and have a pedipalp chela that is not as densely hirsute as in *P. awalei* sp. n. These species also differ genetically (unpublished data).

COMMENTS ON LOCALITIES AND LIFE STRATEGY. *Pandinurus awalei* sp. n. inhabits rocky mountain areas in central Somaliland. The types were collected by day under rocks in open terrain. At this locality, the first author also recorded *Buthus berberensis* Pocock, 1900, *Hottentotta polystictus* (Pocock, 1896), *Neobuthus solegladi* Kovařík, 2019 (type locality), *Parabuthus somalilandus* Kovařík et al. 2019, and *Hemiscorpius* sp.



73



74

Figures 73–74. *Pandinurus awalei* sp. n., female paratype at the type locality (73) and with newborns (74).

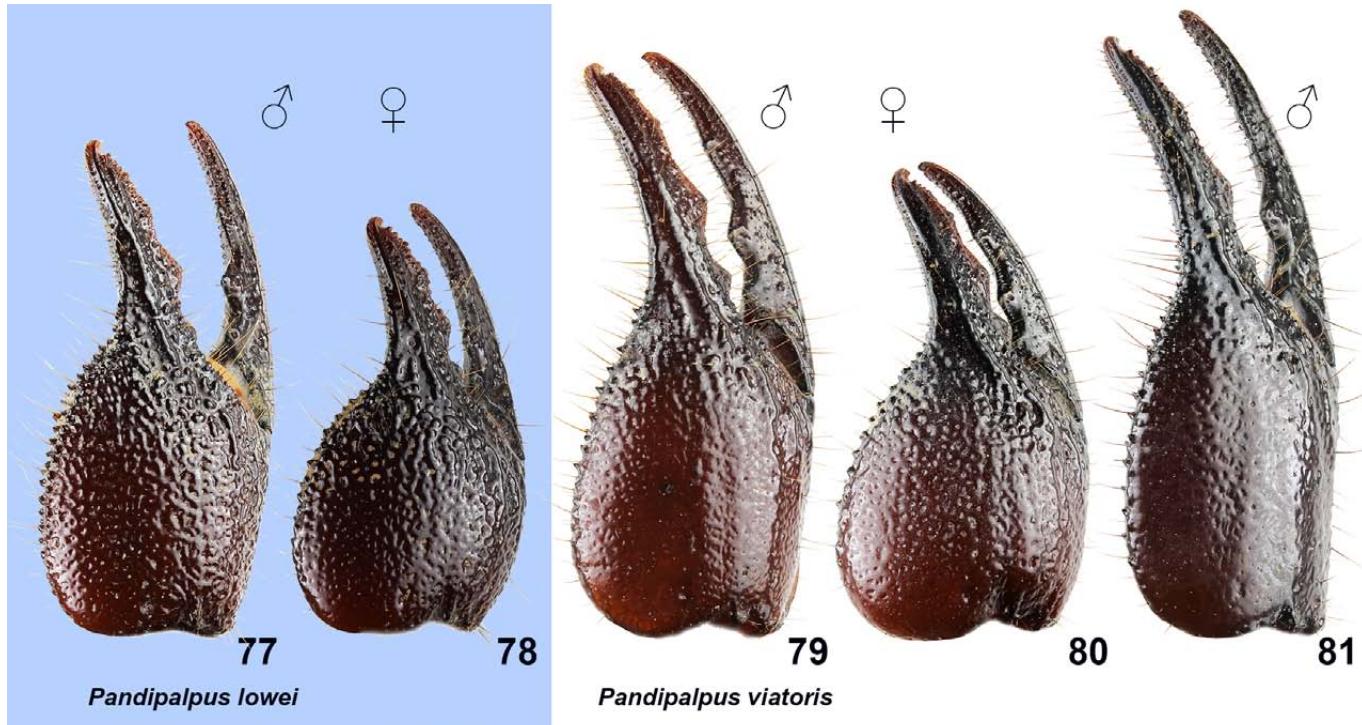


75



76

Figures 75–76. *Pandinurus awalei* sp. n., male paratype shortly after maturity ecdysis (75) and young female paratype two months after maturity ecdysis (76).



Figures 77–81: Pedipalp chela dorsal views. **Figures 77–78.** *Pandipalpus lowei*, male (77) and female (78) paratypes from type locality. **Figures 79–81.** *Pandipalpus viatoris*, male (79) and female (80) from Democratic Republic of Congo, Kamonga (FKCP), and male (81) from Tanzania, Iringa Province (FKCP).

Taxonomic position of *Pandinurus intermedius* (Borelli, 1919)

Prendini & Loria (2020: 442) formally synonymized *Pandinus intermedius* Borelli, 1919 under *Pandinus citernii* Borelli, 1919 (both now in the genus *Pandinurus*), “two Ethiopian species of *Pandinurus*, described from the same type locality”, without explanation of their taxonomic act. In their paragraph, the authors cited only “unpublished data”. They did not address previously proposed diagnostic characters, in particular chelal trichobothrium *ea*, which is present in *P. intermedius* and absent in *P. citernii*, and ignored other morphological characters published in Kovařík et al. (2017c). They characterized these as “Ethiopian” species, although the originally cited type localities are actually located in Somalia. In fact, two separate areas of distribution in Ethiopia were indeed confirmed by Kovařík et al. (2017c). However, the co-occurrence of both species at “the same type locality” in Somalia had not been confirmed. Borelli (1919) studied specimens collected by Carlo Citerni, and there is a significant possibility that Citerni did not personally collect these specimens and assign locality labels himself. It has been repeatedly documented that old specimens in Italian museums are labelled with imprecise localities, and their true geographic distributions need to be independently confirmed (see also Kovařík et al. 2019: 61). The confirmed distributions of both the species in Ethiopia, as well as their unconfirmed type locality in Somalia, are mapped in Fig. 83. In addition, recent DNA and chromosomal analysis further supports the view that both are separate and valid species. For example,

P. intermedius has a constant number of chromosomes of $2n=110$, whereas *P. citernii* has a different and constant number of chromosomes of $2n=120$ (Štundlová, 2019). We therefore reinstate *Pandinurus intermedius* (Borelli, 1919) as a valid species distinct from *P. citernii* (Borelli, 1919).

Taxonomic position of *Pandipalpus lowei* (Kovařík, 2012)

Prendini & Loria (2020: 442) formally synonymized *Pandinus lowei* Kovařík, 2012 under *Pandinus viatoris* Pocock, 1890 (both now in the genus *Pandipalpus*), citing only “unpublished data” and not providing specific details or analyses to support their taxonomic act. They wrote: “*It is also evident, based firstly on the absence of consistent morphological differences, and secondly on low genetic divergence between samples collected at the type locality of Pandinus lowei Kovařík, 2012, and across the distribution of *P. viatoris* (unpublished data), that these taxa are conspecific, justifying the following synonymy*”. However, the claim of “*the absence of consistent morphological differences*” is inconsistent with our data. For example, as illustrated in Figs. 77–81, there are pronounced differences in the morphometrics and granulation of the pedipalp chelae of these two species. The *P. viatoris* male from Kamonga, Democratic Republic of Congo (Fig. 79), a locality relatively close (250 km) to the type locality of *P. lowei* (Lusinga, Parc National de Upemba, Democratic Republic of Congo) has distinctly more elongate pedipalp fingers and weaker manus granulation vs. the *P. lowei* male (Fig. 77). The chela of another *P. viatoris* male

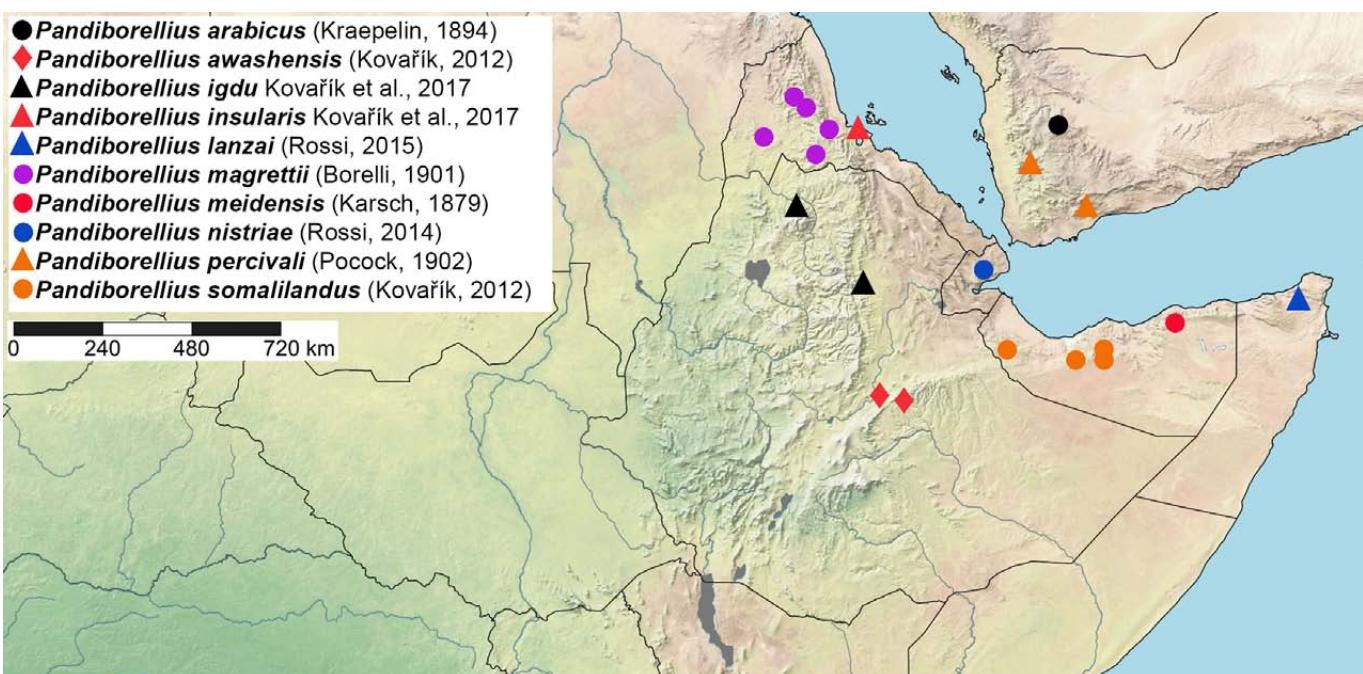


Figure 82. Map showing confirmed distribution of *Pandiborelius* spp..

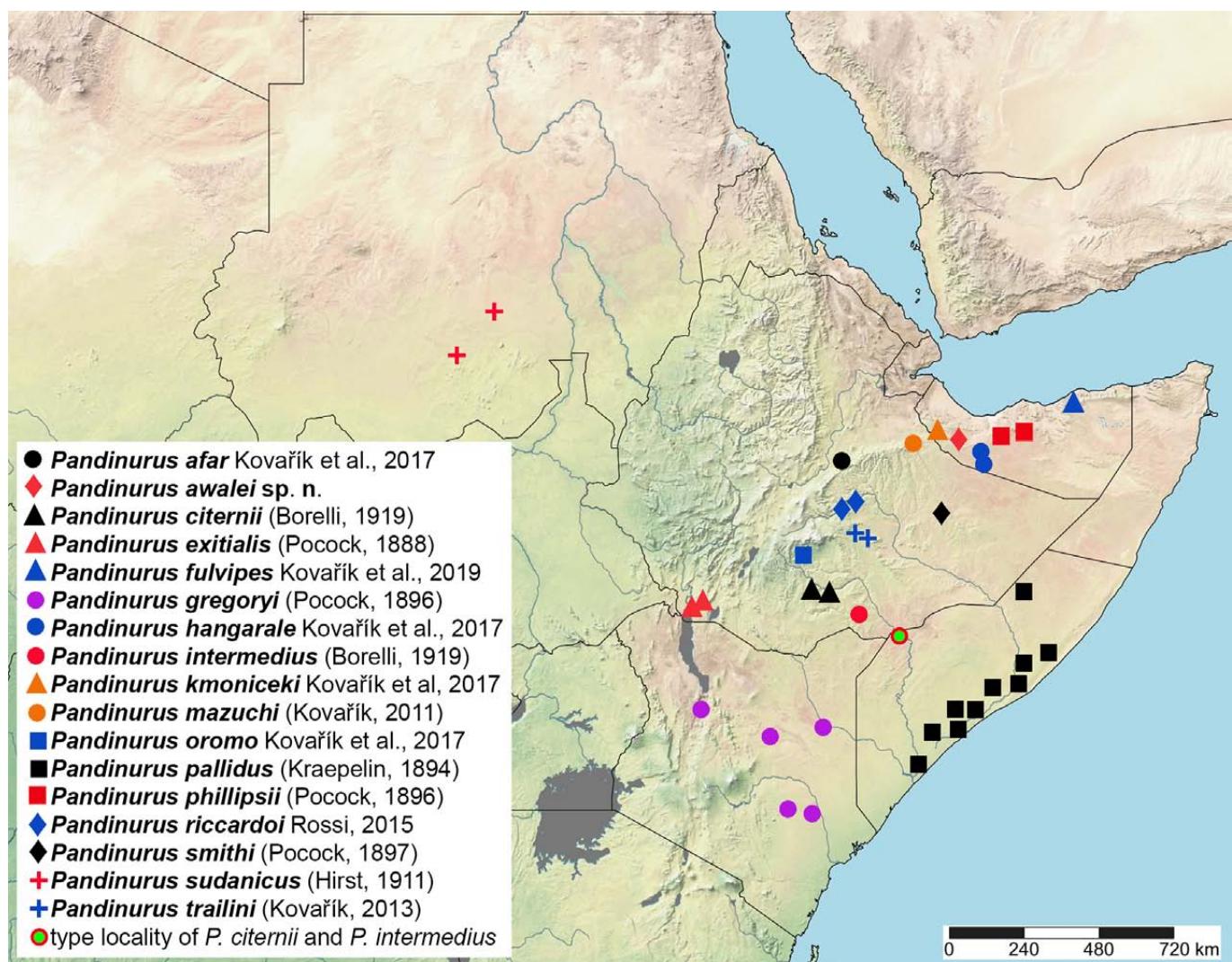


Figure 83. Map showing confirmed distribution of *Pandinurus* spp..

(Fig. 81) is very similar, although it originates from Iringa, Tanzania, a locality separated from Kamonga by 1,100 km. Also very similar is the chela of another male from 92 km NW of Mpika, Zambia (460 km from Kamonga) (see fig. 38 in Kovařík, 2012: 12). This indicates that the morphology is stable over the wide geographic range of *P. viatoris* (Kovařík, 2012: 19, fig. 64), and there is no obvious character gradient that links or overlaps with *P. lowei*. Other diagnostic characters separating the two species were cited in Kovařík (2012). The second justification of synonymy by “*low genetic divergence*” was not demonstrated in Prendini & Loria (2020), and there was no indication that the authors analyzed the types of these species. Considering the absence of convincing evidence for synonymy, and the documented morphological differences, we reinstate *Pandipalpus lowei* (Kovařík, 2012) as a valid species distinct from *P. viatoris* (Pocock, 1890).

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