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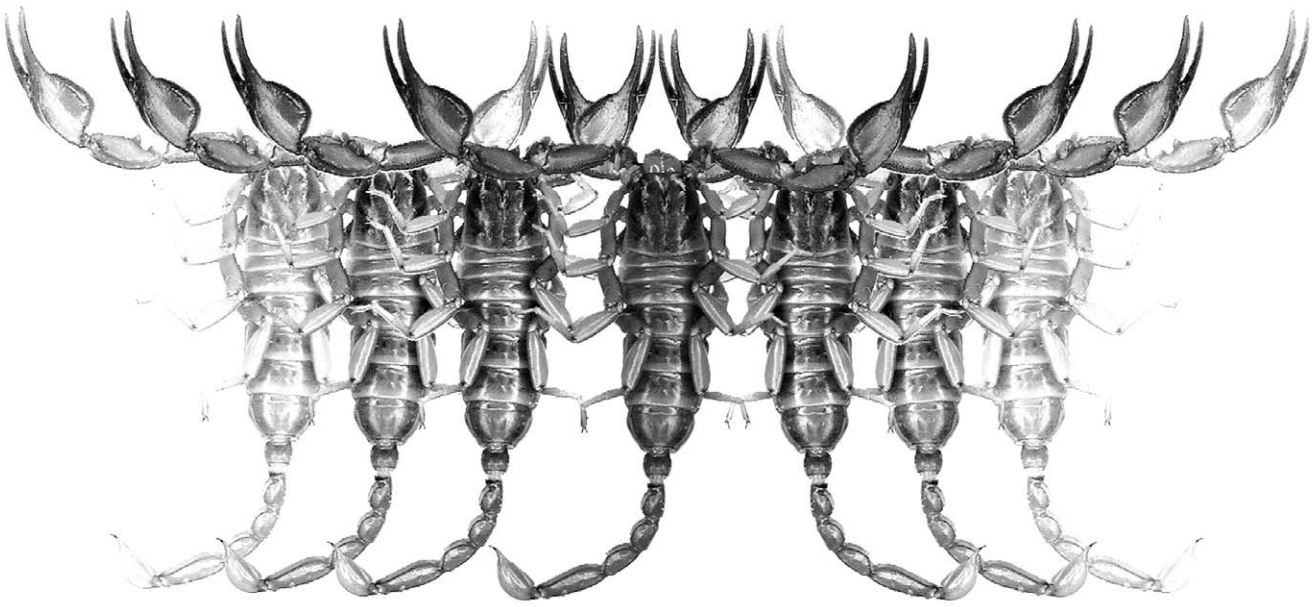

Scorpions of the Horn of Africa (Arachnida: Scorpiones). Part XII. *Pandinurus hangarale* sp. n. (Scorpionidae) from Somaliland and a Review of Type Locality and True Distribution of *Pandinurus smithi* (Pocock, 1897)

František Kovařík, Graeme Lowe, Tomáš Mazuch, Ahmed Ibrahim Awale, Jana Štundlová & František Šťáhlavský

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Euscorpius — Occasional Publications in Scorpiology. 2017, No. 253

Scorpions of the Horn of Africa (Arachnida: Scorpiones). Part XII. *Pandinurus hangarale* sp. n. (Scorpionidae) from Somaliland and a review of type locality and true distribution of *Pandinurus smithi* (Pocock, 1897)

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Summary

Pandinurus hangarale **sp**. **n**. from Somaliland is described and fully complemented with color photos of live and preserved specimens, as well as its habitat. Hemispermatophore of *P. hangarale* **sp**. **n**. is illustrated and described. In addition to the analyses of external morphology and hemispermatophores, we also describe the karyotype of *P. hangarale* **sp**. **n**. (2n=120). Known localities of *Pandinurus smithi* (Pocock, 1897) are compiled; the type locality is not in Somaliland but in Ethiopia (Turfa) and in reality it is probably an endemic of Ethiopia.

Methods, Material & Abbreviations

Nomenclature and measurements follow Stahnke (1971), Kovařík (2009), and Kovařík & Ojanguren Affilastro (2013), except for trichobothriotaxy (Vachon, 1974). Hemispermatophore terminology follows Kovařík et al. (2016). The terms 'external', 'internal', 'dorsal' and 'ventral' refer to somatic axes with the hemispermatophore *in situ*; the terms distal/ apical and proximal/ basal are relative to the foot as the basalmost structure. Nomenclature of most lobes follows Lamoral (1979), but following Stockwell (1988) we apply the term 'internobasal reflection of sperm duct' for the eversible sperm tube or valve (= 'median transverse trough' + 'inner lobe' of Lamoral), 'proximal lobe' refers to the rounded lobe at the proximal internal end of this structure, and 'truncal flexure' (= 'median transverse cleavage' of Lamoral) is where the distal lamina joins the trunk (c.f., Figs. 30–33). For biometrics, we define the distal lamina as starting at the truncal flexure, and we take the proximal base of the hook as the demarcation between proximal and distal sections of the distal lamina. L, length; W. width; D, depth. Terminology of tarsal armature follows Kovařík et al. (2017).

Chromosome preparations were made using the plate spreading technique which is routinely used in scorpions (e. g. Kovařík et al., 2009, Plíšková et al., 2016). The chromosomes were stained by 5% Giemsa solution in Sörensen phosphate buffer for 30 min. Five spermatocyte nuclei were selected for a detailed karyotype analysis. The relative diploid set length was measured using the software Image J 1.45r (http://rsbweb.nih.gov/ij) with the plugin Levan (Sakamoto & Zacaro, 2009).

We intentionally use here the name Somaliland (Hargeisa) for the northern territory (Republic of Somaliland) corresponding to the former British colony (British Somaliland), which we distinguish from Somalia (Mogadisho). Somaliland has its own currency, a functional government with representation in several countries, and its officials contributed to our safe visit.

Specimen Depositories: BMNH (The Natural History Museum, London, United Kingdom) and FKCP (František Kovařík, private collection, Prague, Czech Republic).

All newly collected material was preserved in 80% ethanol or is still alive in the first author's (FKCP) collection.

Systematics

Family Scorpionidae Latreille, 1802
Subfamily Scorpioninae Latreille, 1802

Pandinurus Fet, 1997
(Figs. 1–35, 37, Table 1)

Pandinus (*Pandinurus*) Vachon, 1974: 953 (*nomen nudum*, type species not designated); Fet, 1997: 248; Fet, 2000: 470–473 (in part) (complete reference list until 2000).

Pandinurus: Kovařík et al., 2017: 42–100 (Figs. 5–18, 144–167, 175–181, 183, 185, 187, 194–394, 396, Table 2) (historical and taxonomic comments, complete reference list), Kovařík et al., 2017: 1–14.

TYPE SPECIES. *Scorpio exitialis* Pocock, 1888.

DIAGNOSIS. Total length 70–135 mm. External trichobothria on patella number 16–21 (5–6 *eb*, 3–6 *esb*, 2 *em*, 3–4 *est*, 3 *et*); ventral trichobothria on patella number 29–59; accessory external trichobothrium *ea* on chela absent or present, internal trichobothria on chela number 1–4; ventral trichobothria on chela number 10–19. Pedipalp chela manus lobiform. Dorsoexternal carina on pedipalp chela absent. Male has pronounced median lobe on movable finger of pedipalp and larger telson than female. Pectines with fulcra. Pectinal teeth number 12–22. Sternum subpentagonal, longer than wide. Carapace without distinct carinae. Dentate margins of movable and fixed fingers of pedipalp chela with distinct granules in two parallel rows present in distal half of fingers. Proximal half of fingers almost without granules in males and with distinct granules in a row in juveniles and females. These granules do not cover whole median lobe in males, but are usually represented by only several granules on top of lobe. Tergites I–VI of mesosoma bear one carina. Stridulation organ located on pedipalp coxae and first pair of legs, but can be reduced. Metasomal segments I–IV with paired, parallel ventral submedian carinae present. Telson without subaculear tubercle. Legs with one pedal spur, retrolateral spur absent.

***Pandinurus hangarale* sp. n.**
(Figs. 1–25, 28–35, 37, Table 1)
http://zoobank.org/urn:lsid:zoobank.org:act:B6E336AC-8C6E-4097-8DD3-BDD406FABA51

? *Scorpio smithii* Pocock, 1897: 398–400 (in part).
? *Pandinus* (*Pandinus*) *smithi*: Pocock, 1900: 58 (in part).

TYPE LOCALITY AND TYPE REPOSITORY. **Somaliland**, Toon village near Hargeisa, 09°23'30"N 44°07'10"E, 1272 m a.s.l.; FKCP.

TYPE MATERIAL. **Somaliland**, Toon village near Hargeisa, 09°23'30"N 44°07'10"E, 1272 m a.s.l. (Locality No. **17SE**, Figs. 24–25), 8. February 2017, 1♂ (holotype, ecdysis 9.VII.2017, Figs. 1–22, 28–35, DNA No. 1282), 2juvs. alive (paratypes, ecdysis 2.VII.2017, Fig. 23), leg. F. Kovařík et T. Mazuch; south of Qool-Caddday, between Hargeisa and Salahle, Woqooyi Galbeed, 09°11'56"N 44°09'50"E, 18. January 2015, 1juv. (paratype), leg. T. Mazuch.

ETYMOLOGY. *Hangarale* means 'a big black scorpion' in Somali language.

DIAGNOSIS. Total length 95 mm. Color uniformly reddish black to black including legs. Chelicerae brown, reticulate, with black fingers and anterior margin. Carapace lacking carinae and sparsely granulated. External trichobothria on patella number 18–19 (5 *eb*, 5–6 *esb*, 2 *em*, 3 *est*, 3 *et*); ventral trichobothria on patella number 34–40, 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 pointed. Lobe of chela granulated with the same intensity as whole dorsal surface of chela. External surface of chela granulate and without carinae. Internal surface of chela smooth, with conical granules in anterior part. Chela of male length/width ratio is 1.59. Pectinal teeth number 19–22. Dorsal carinae on first through fourth metasomal segments granulate and terminate in a larger tooth most conspicuous on fourth segment. Spiniform formula of tarsomere II = 7/4: 8/4-5: 8-9/5: 8-9/5-6. Tarsomere II with 2 or 3 spines on inclined anteroventral surface. Length to width ratio of male 5th metasomal segment = 2.23.

DESCRIPTION.

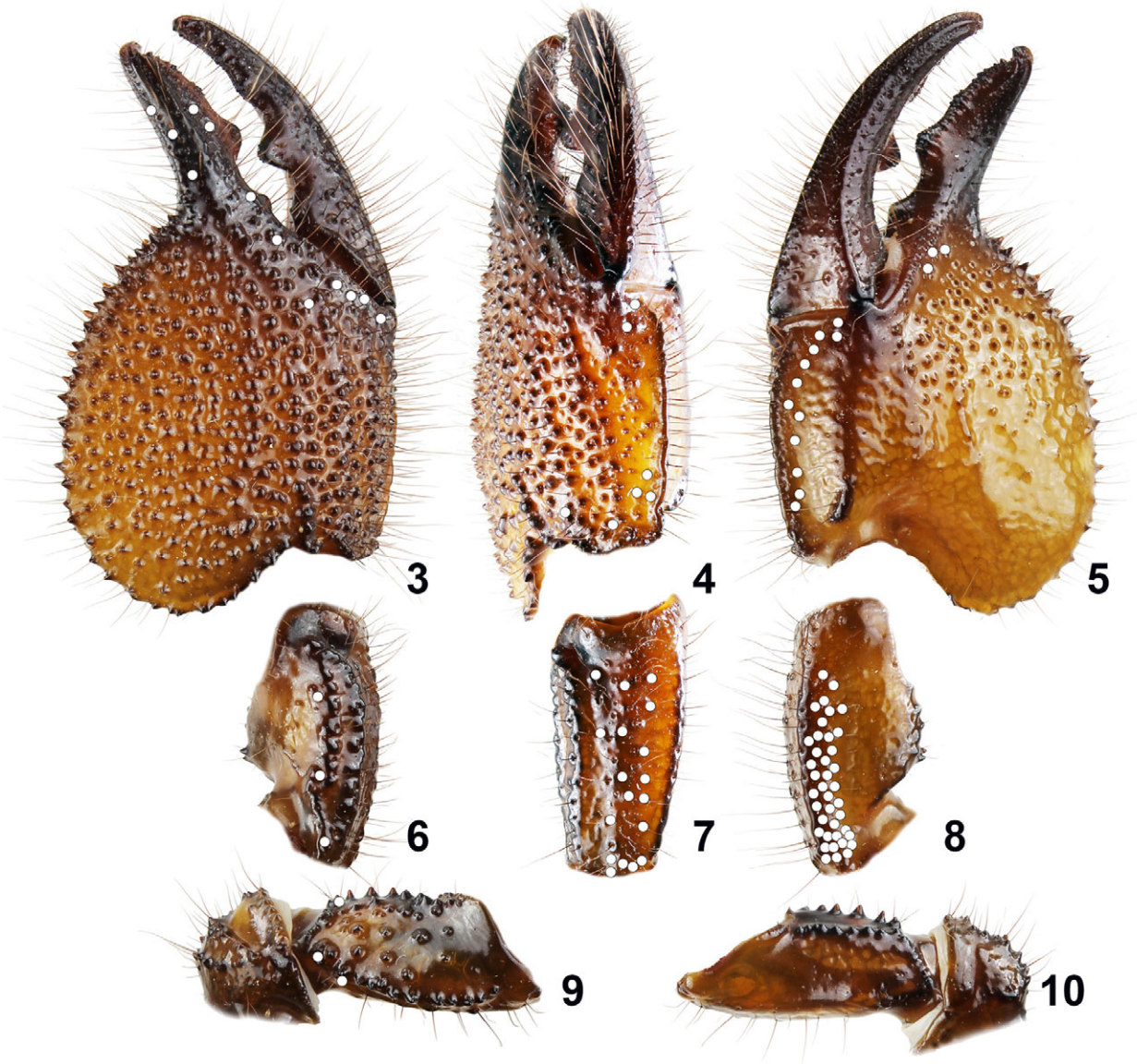
Coloration (Figs. 22–23). The base color is uniformly reddish black to black including legs, telson lighter in specimens shortly after ecdysis, chelicerae brown.

Pedipalps (Figs. 5–14). The pedipalps are densely hirsute, mainly on chela. The femur is smooth with several strong granules dorsally and bears four carinae composed of several strong granules. The patella is smooth and rugose, there are five carinae, mainly the dorsal are composed of large granules. The granules on the dorsoexternal surface of chela of pedipalp are conical and pointed. The margin of lobe of chela granulated with the same intensity as the whole lobe of chela. The internal surface of chela smooth in posterior part,

Figures 1–2: *Pandinurus hangarale* **sp**. **n**., male holotype in dorsal (1) and ventral (2) aspects. Scale bar: 10 mm.

with conical granules in anterior part and two short carinae indicated only. The dentate margins of movable and fixed fingers of the pedipalp with distinct granules in a two parallel rows present in anterior half of the fingers. Posterior half of fingers almost without granules in male. *Trichobothriotaxy*. External trichobothria on the patella number 18–9 (5 *eb*, 5–6 *esb*, 2 *em*, 3 *est*, 3 *et*); accessory external trichobothrium *ea* on chela absent, ventral trichobothria on patella number 34–40; internal trichobothria on chela number 3, ventral trichobothria on chela number 11–13.

Metasoma and telson (Figs. 15–17). The metasomal segments I–IV each bear a total of 8 carinae of which the ventral submedians on segment I are obsolete or missing; lateral median carinae are indicated on segments I–IV by incomplete rows of granules; ventral

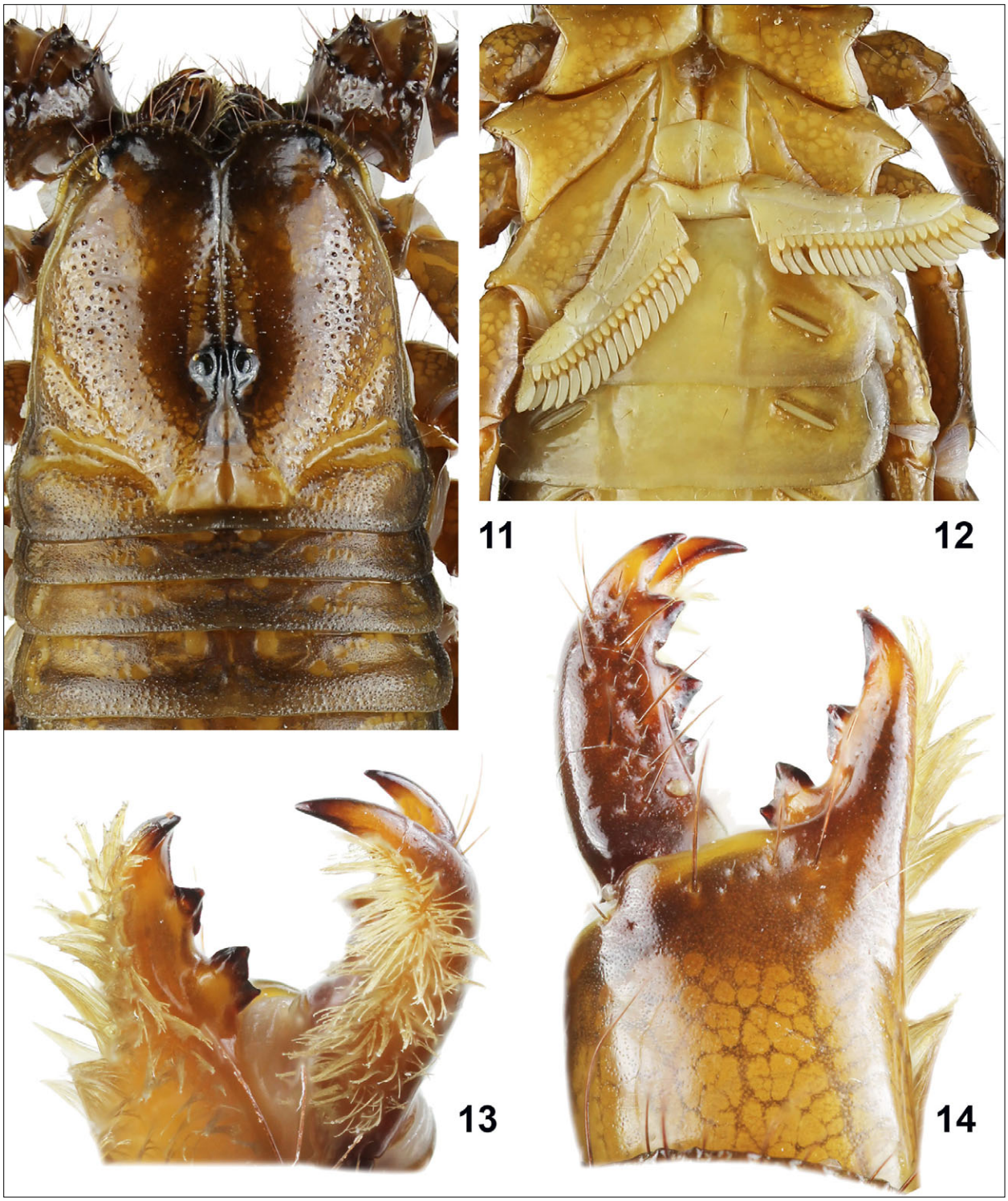


Figures 3–10: *Pandinurus hangarale* **sp**. **n**., male holotype, pedipalp segments. Chela dorsal (3), external (4) and ventrointernal (5). Patella dorsal (6), external (7) and ventral (8). Femur and trochanter dorsal (9) and ventral (10). Trichobothrial pattern is indicated.

submedian carinae on segments I–III are smooth. Other carinae are sparsely granulated. Segment V has five carinae developed and granulated. The dorsal and lateral surfaces of the segments are rugose with several granules, segments IV–V are more granulated. The dorsal carinae on segments I–IV are sparsely granulate and terminate in a larger tooth most conspicuous on third and fourth segments. The entire metasoma and telson are sparsely hirsute with long setae. The telson is rugose, bulbous, with the aculeus shorter than vesicle.

Carapace and mesosoma (Figs. 11–12). The entire carapace is smooth in the middle, sparsely to densely covered by granules medially and posteriorly. The anterior margin of the carapace is bilobate, strongly emarginate medially, and bears several macrosetae. The tergites are finely granulated, more so in the male. The pectinal tooth count is 19 in the male, 20–22 in the juveniles. The pectine marginal tips extend to the first quarter of the fourth sternite in the male. The sternites are smooth, without carinae, but with two longitudinal furrows.

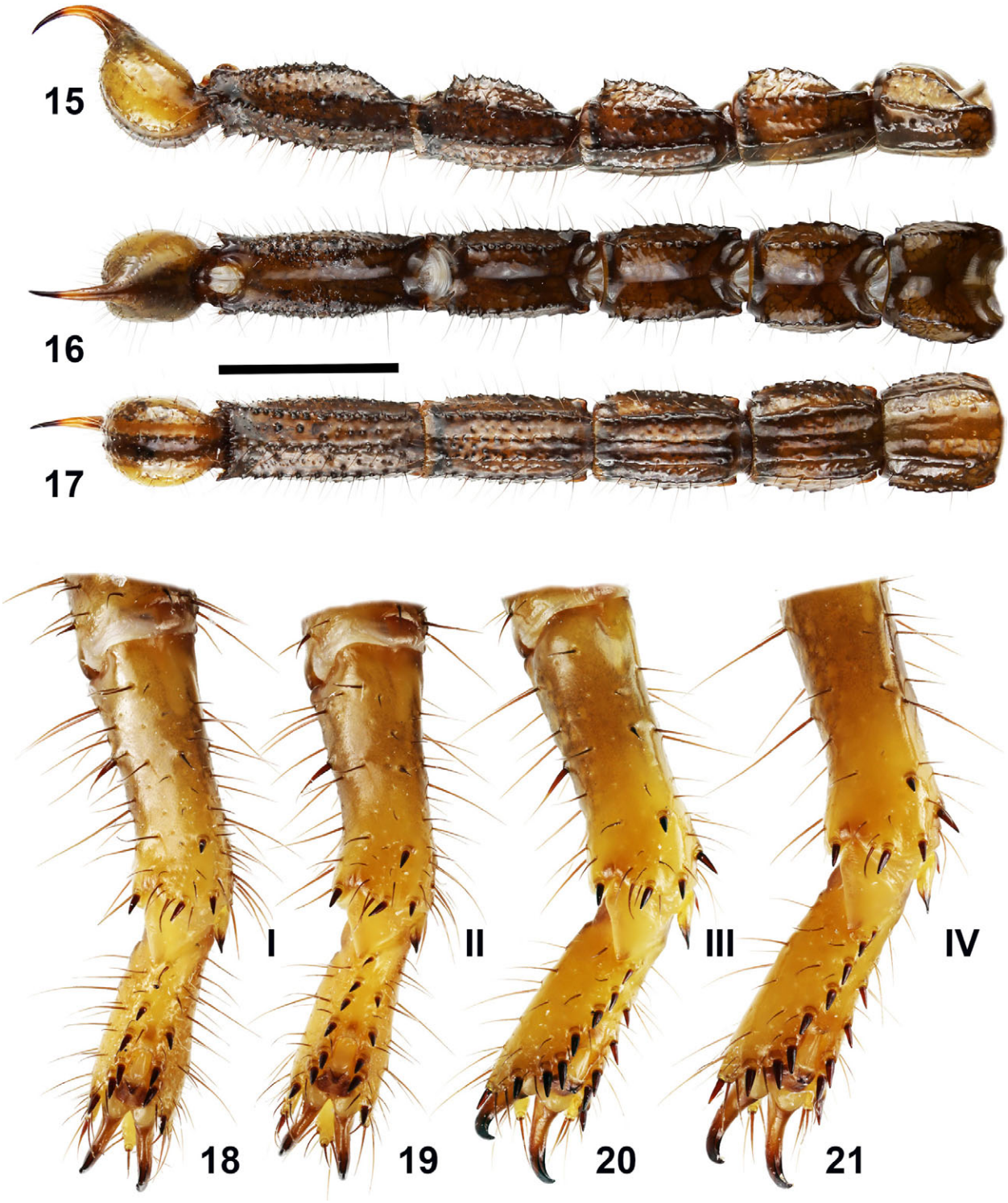
Chelicerae (Figs. 13–14). Movable finger dorsal edge with one large subdistal (*sd*) denticle; ventral edge smooth; ventral distal (*vd*) denticle longer than prominent dorsal (*dd*) denticle. Fixed finger with four denticles, median (*m*) and basal (*b*) denticles conjoined on common trunk; no ventral accessory denticles present.



Figures 11–14: *Pandinurus hangarale* **sp**. **n.,** male holotype. Carapace and tergites I–III (11), coxosternal area and sternites III–IV (12), left chelicera ventral (13) and dorsal (14).

Legs (Figs. 18–21). All legs without distinct carinae and smooth. The tarsomeres are hirsute with setae and macrosetae. Spiniform formula of tarsomere II = 7/4: 8/4-5: 8-9/5: 8-9/5-6. Tarsomere II with 2 or 3 spiniform setae on inclined anteroventral surface.

Hemispermatophore. (Figs. 28–33). Lamelliform. Distal lamina long, section distal to hook slightly constricted, straight throughout most of its length, internally angled 12° relative to trunk axis. Apex of distal lamina with a short, curved section starting with a deflection in

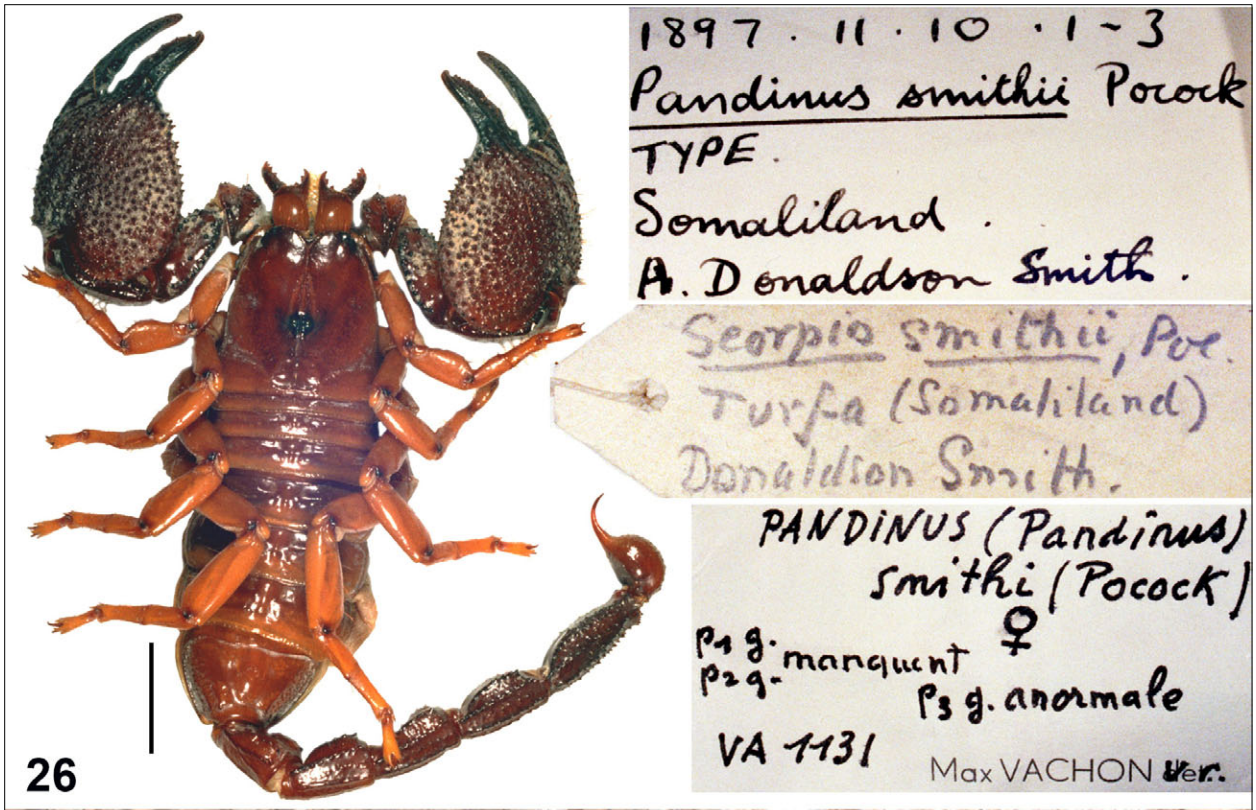


Figures 15–21: *Pandinurus hangarale* **sp. n.,** male holotype. **Figures 15–17**. Metasoma and telson lateral (15), dorsal (16), and ventral (17) views. Scale bar: 10 mm. **Figures 18–21**. Tarsomeres I and II of left legs I–IV, retrolateral aspects.

the external direction at 37° relative to axis of straight section, tapering to a narrow tip. Short, robust hook projecting distally near base of internal margin of distal lamina. Proximal section of distal lamina below hook much shorter than distal section above it, with deep dorsal trough bordered internally by a thick ridge that

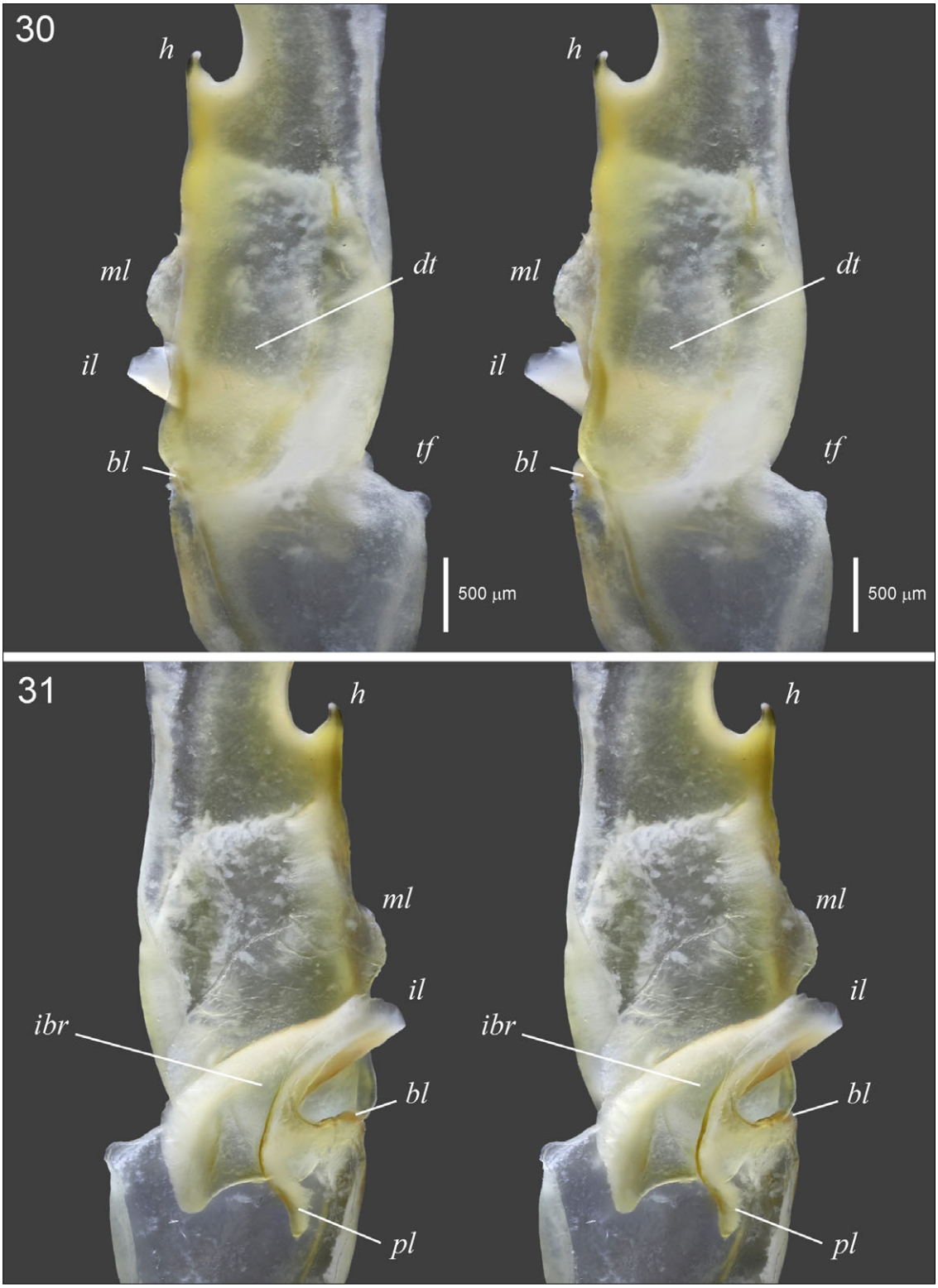
Figures 22–23: *Pandinurus hangarale* **sp**. **n**., in vivo habitus. Male holotype shortly after ecdysis (22) and juvenile paratype (23).

Figure 24–25: *Pandinurus hangarale* **sp**. **n**., the type locality. Photo taken on 8. February 2017. In addition to *P. hangarale* **sp**. **n**. the first author recorded at this locality *Gint calviceps* (Pocock, 1900) and *Parabuthus heterurus* Pocock, 1897.

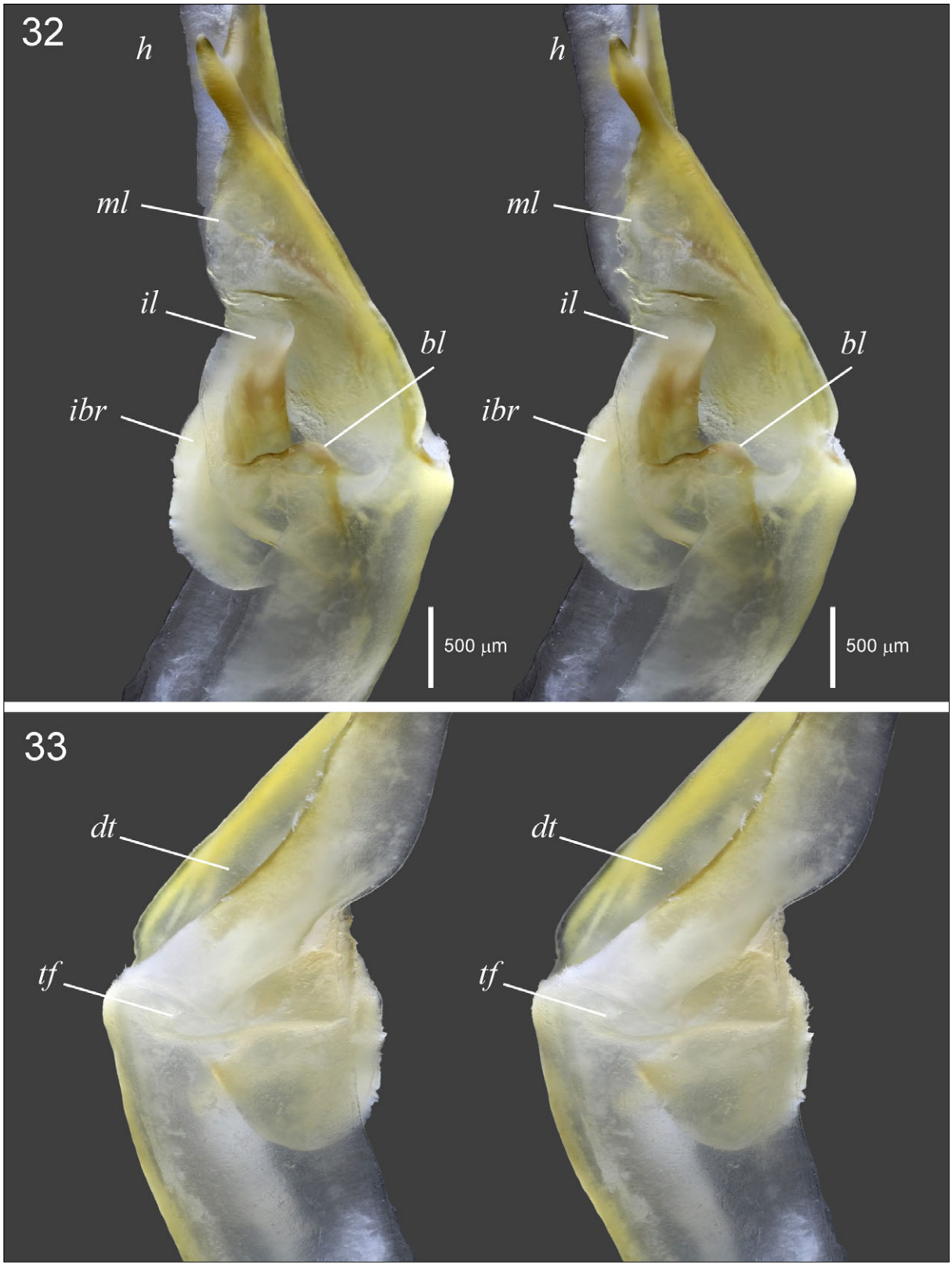


Figures 26–27: *Pandinurus smithi* (Pocock, 1897). **Figure 26**. Female lectotype and original labels. Scale bar: 10 mm for the female lectotype. **Figure 27.** Male, at the locality, Ethiopia, 55 km S of Degehbur, 07°49'27.2"N 43°41'56.3"E, 1053 m a.s.l.

Figures 28–29: *Pandinurus hangarale* **sp**. **n.,** male holotype, left hemispermatophore. Dorsal (convex) (28) and ventral (concave) (29) views. Scale bar: 2 mm.



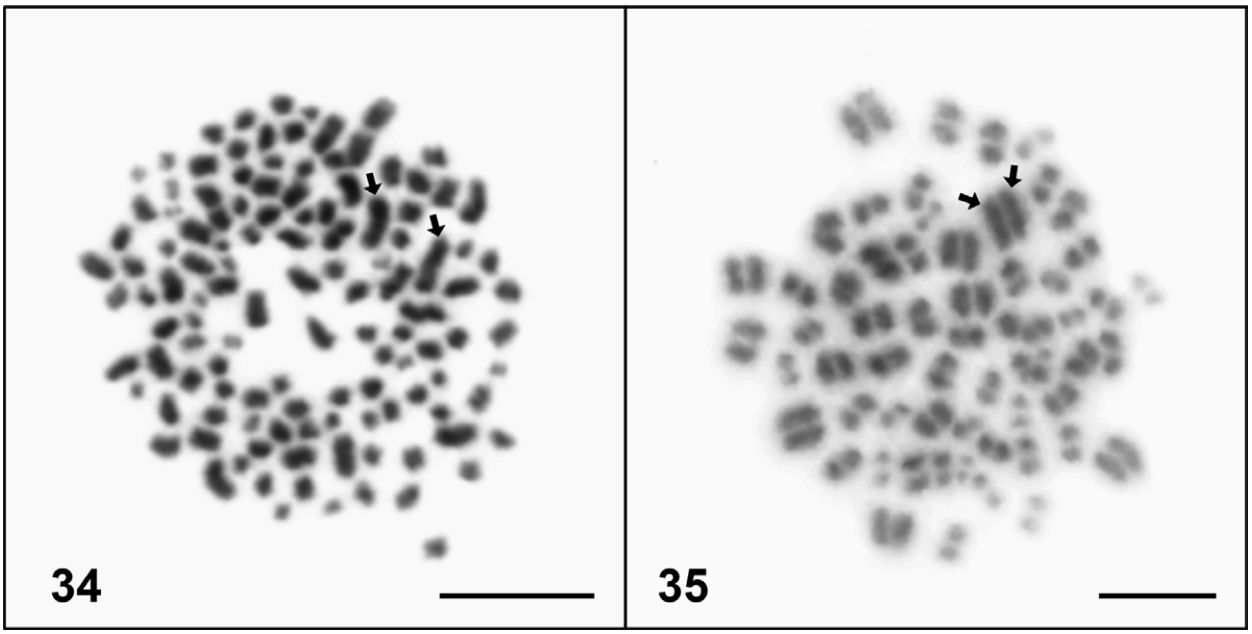
Figures 30–31: *Pandinurus hangarale* **sp**. **n.,** male holotype, left hemispermatophore, capsule region. Dorsal (convex) (30) and ventral (concave) (31) cross-stereoscopic views. Scale bar: 500 µm. Label abbreviations: *bl*, basal lobe; *dt*, dorsal trough; *h*, hook; *ibr*, internobasal reflection of sperm duct (= median transverse trough); *il*, inner lobe, *ml*, median lobe; *tf*, truncal flexure (= median transverse cleavage).



Figures 32–33: *Pandinurus hangarale* **sp**. **n.,** male holotype, left hemispermatophore, capsule region. Internal (sperm duct margin) (32) and external (distal lamina margin) (33) cross-stereoscopic views. Scale bar: 500 μm. Label abbreviations: see legend for Figs. 30–31.

Dimensions (MM)		***P. hangarale* sp. n.** ♂ **holotype**
Carapace	L / W	14.7 / 15.2
Mesosoma	L	24.1
Tergite VII	L / W	6.50 / 11.3
Metasoma and telson	L	55.35
Segment I	L / W / D	6.75 / 7.03 / 5.25
Segment II	L / W / D	7.75 / 6.65 / 5.63
Segment III	L / W / D	8.50 / 5.95 / 5.60
Segment IV	L / W / D	9.25 / 5.30 / 5.40
Segment V	L / W / D	11.5 / 5.15 / 5.20
Telson	L / W / D	11.6 / 5.20 / 5.00
Pedipalp	L	44.7
Femur	L / W	10.6 / 5.05
Patella	L / W	10.9 / 5.60
Chela	L	23.2
Manus	W / D	14.6 / 6.70
Movable finger	L	14.7
Total	**L**	**94.15**

Table 1: Comparative measurements of male holotype of *Pandinurus hangarale* **sp. n.** Abbreviations: length (L), width (W, in carapace it corresponds to posterior width), depth (D).



Figures 34–35: *Pandinurus hangarale* **sp**. **n.,** male holotype, chromosomes (2n=120). Mitotic metaphase (34), meiotic metaphase I (35). Arrows indicate the largest chromosome pair. Scale bar: 10 μm.

connects to the base of the hook. Median lobe broad, rounded, without any distinct ridge. Internobasal reflection of sperm duct elongate, wide at base, becoming a narrower tube distally. Proximal lobe parabolic in profile. Basal lobe blunt, rounded, symmetric in profile, pointing towards distal direction. Trunk relatively short, broad, gradually tapered towards base, with weak but well defined diagonal axial rib. Measurements (mm) (holotype): distal lamina: total L 10.93; oblique L distal to hook 8.12; straight section L 7.12, W 1.17; proximal section (truncal flexure to hook base) L 2.76, W 1.51; trunk L 3.92; foot L 2.66. Morphometric ratios: distal lamina straight section L/W 6.09; distal lamina ratio of L distal to hook/ L proximal to hook 2.94, W distal to hook/ W proximal to hook 0.77; distal lamina total L/ trunk L 2.79.

Karyotype (Figs. 34–35). The diploid complement of the male holotype consists of 120 chromosomes (Fig.

34). All observed postpachytene and metaphase nuclei display 60 homomorphic bivalents (Fig. 35). The first pair of chromosomes is significantly longer (2.46 % diploid set length (DSL) than the remaining chromosomes that gradually decrease in size from 1.75 % to 0.41 % DSL. We are not able to reliably determine the morphology of individual chromosomes in karyotype due to insufficient visibility of the centromeric regions. This would require additional banding techniques.

Measurements. See Table 1.

AFFINITIES. The described features distinguish *Pandinurus hangarale* **sp**. **n**. from all other species of the genus. *P. hangarale* **sp**. **n**. is morphologically most similar to *P. trailini* (Kovařík et al., 2013), more than to *Pandinurus smithi* (Pocock, 1897) which can be unequivocally separated from both these species by bright yellow legs (see Fig. 27 versus Fig. 23). *P. hangarale* **sp**. **n**. can be separated from *P. trailini* besides the very different area of occurrence by: **1**) ventral trichobothria on pedipalp chela number 11–13 in *P. hangarale* **sp**. **n**. vs. 13–18 in *P. trailini*; **2**) chela of male length/ width ratio is 1.59 in *P. hangarale* **sp**. **n**. vs. 1.67–1.81 in *P. trailini*; **3**) spiniform formula of tarsomere II = 7/4: 8/4-5: 8-9/5: 8-9/5-6 in *P. hangarale* **sp**. **n**. vs. = 6/4: 6-7/4: 7-8/4: 7-8/4-5 in *P. trailini*; **4**) length to width ratio of male 5th metasomal segment = 2.23 in *P. hangarale* **sp**. **n**. vs. 2.60–2.75 in *P. trailini*. These two species also have different numbers of chromosomes (2n=120 in *P. hangarale* **sp**. **n**. vs. 2n=118 in *P. trailini* (Štundlová et al., in preparation)).

Pandinurus smithi (Pocock, 1897)
(Figs. 26–27, 37)

Scorpio smithii Pocock, 1897: 398–400 (in part).

Pandinus smithi: Kraepelin, 1903: 568–569.

Pandinus (*Pandinus*) *smithi*: Pocock, 1900: 58 (in part); Vachon, 1974: 953; Fet, 2000: 468 (complete reference list until 2000); Kovařík, 2003: 152; Kovařík, 2009: 58, 126, figs. 389–391; Kovařík, 2011: 9–10, 14, figs. 20–22, 41; Kovařík, 2013: 13, fig. 36.

Pandinurus smithi: Kovařík et al, 2017: 89–96, figs. 16, 160–161, 201, 390–393, 396.

TYPE LOCALITY AND TYPE REPOSITORY. **Ethiopia**, Turfa (new designation, see comments below); BMNH.

TYPE MATERIAL EXAMINED. Somaliland (now Ethiopia), Turfa, 1♀ (lectotype, Fig. 26 and figs. 392–393 in Kovařík et al., 2017: 94), BMNH No. 1897.11.10.1-3.

ADDITIONAL MATERIAL EXAMINED. **Ethiopia**, 55 km S of Degehbur, 07°49'27.2"N 43°41'56.3"E, 1053 m a.s.l. (Locality No. **11EV**, figs. 20 and 22 in Kovařík, 2011: 9), 17.VII.2011, 1♂ (Fig. 27 and figs. 16, 160–161, 201, 390–391 in Kovařík et al., 2017), leg. F. Kovařík, FKCP.

DIAGNOSIS. Total length 100–110 mm. Color uniformly reddish brown; legs bright yellow; chela orange to reddish brown. Chelicerae yellowish brown, reticulate, with black fingers and anterior margin. Carapace lacking carinae and sparsely granulate. External trichobothria on patella number 17 (5 *eb*, 4 *esb*, 2 *em*, 3 *est*, 3 *et*); ventral trichobothria on patella number 32–34; internal trichobothria on chela number 3, accessory external trichobothrium *ea* on chela absent, ventral trichobothria on chela number 12–15. Pedipalp very densely hirsute, mainly on chela. Granules on manus of pedipalp conical and pointed. Lobe of chela granulated with the same intensity as whole dorsal surface of chela. External surface of chela granulate but without carinae. Chela of male length/ width ratio is 1.56. Pectinal teeth number 18–21 in both sexes. Dorsal carinae on first through fourth metasomal segments granulate and terminate in a larger tooth most conspicuous on fourth segment. Spiniform formula of tarsomere II = 7/4: 7-8/4: 8-9/5-6: 8-9/6-7. Tarsomere II with 3 spines on inclined anteroventral surface. Length to width ratio of male 5th metasomal segment = 2.29.

COMMENTS . Pocock (1897: 398–400) described *P. smithi* from a female 104 mm long from Turfa and a male 105 mm long, probably also from Turfa in "Somaliland" and cited also four other specimens from Somaliland, a female 114 mm long from Silul, a female 106 mm long from Hargesa (Hargeisa), and a male 110 mm long and a young male without a special locality. Pocock (1897: 399) wrote about these four other specimens: "Four other examples were also obtained, and these differ from the two describing in having the legs reddish brown or reddish green in color instead of a bright redish yellow". Pocock (1897: 400) also cited two immature examples from Ahdeh and Boholgarshan which "apparently belonging to this species". Later Pocock (1900: 58) cited "Hargeisa, Silul, Abdeh, and Turfa in Somaliland" as localities of *P. smithi*.

The first author (FK) studied and designated as lectotype the female from Turfa (Fig. 26) but incorrectly cited the type locality Silul (Kovařík, 2003: 152) or Hargeisa (Kovařík, 2009: 58; Kovařík, 2011: 10; 2; Kovařík et al., 2017: 89). We here correct this error and recognize the type locality of *Pandinurus smithi* as Turfa (see Fig. 26). Another problem is that Pocock located Turfa and all other localities of the cited specimens in Somaliland which is accepted by all recent authors. Fig. 36 shows a map of Africa published in 1885, which explains why Pocock cited the localities as these places in Somaliland and titled his 1897 paper "The first expedition from Somaliland to lake Lamu". However,

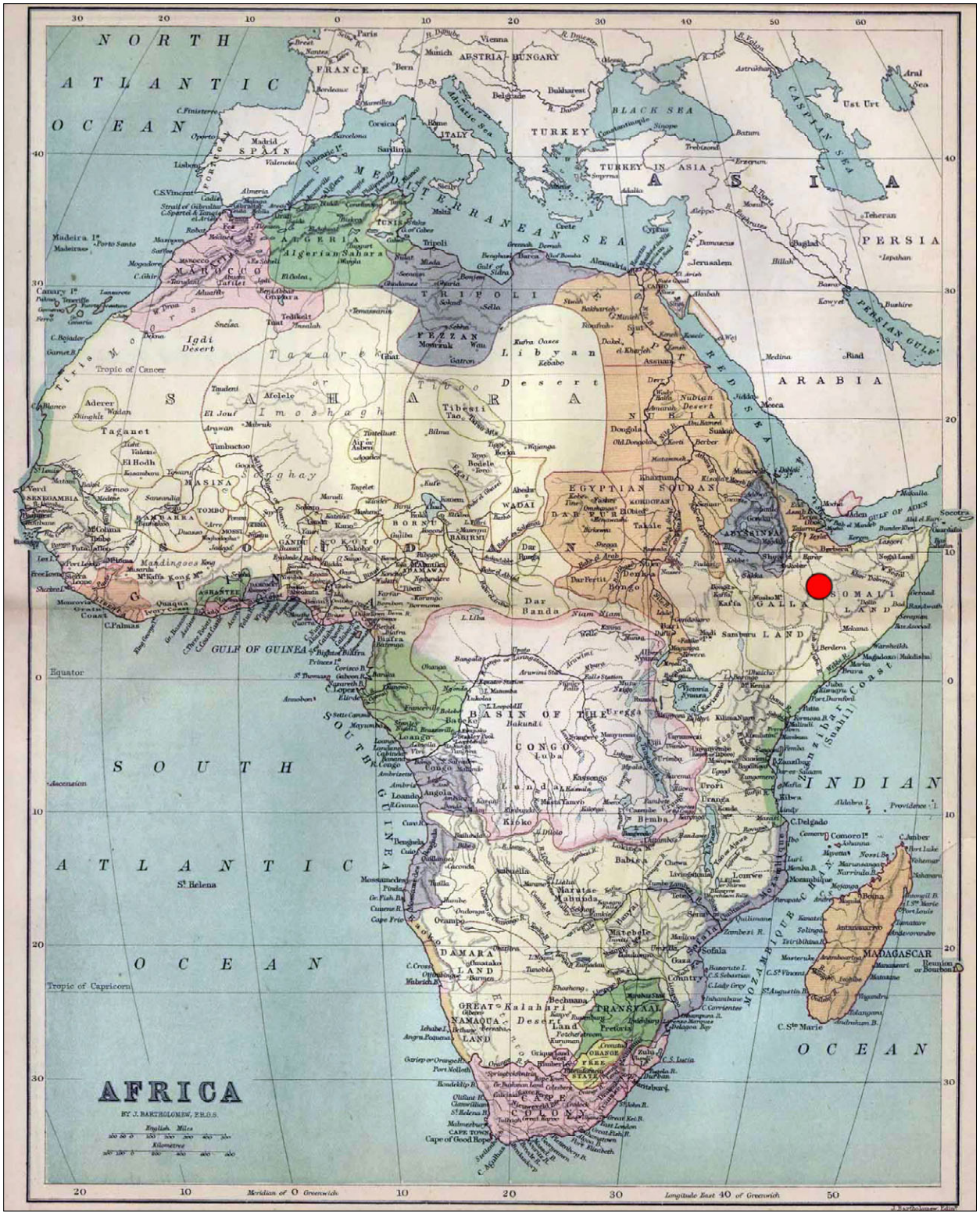


Figure 36: Map of Africa from 1885 (origin https://commons.wikimedia.org/wiki/File:African_map_1885.jpg) with the place where Turfa and Silul are located marked by red point.

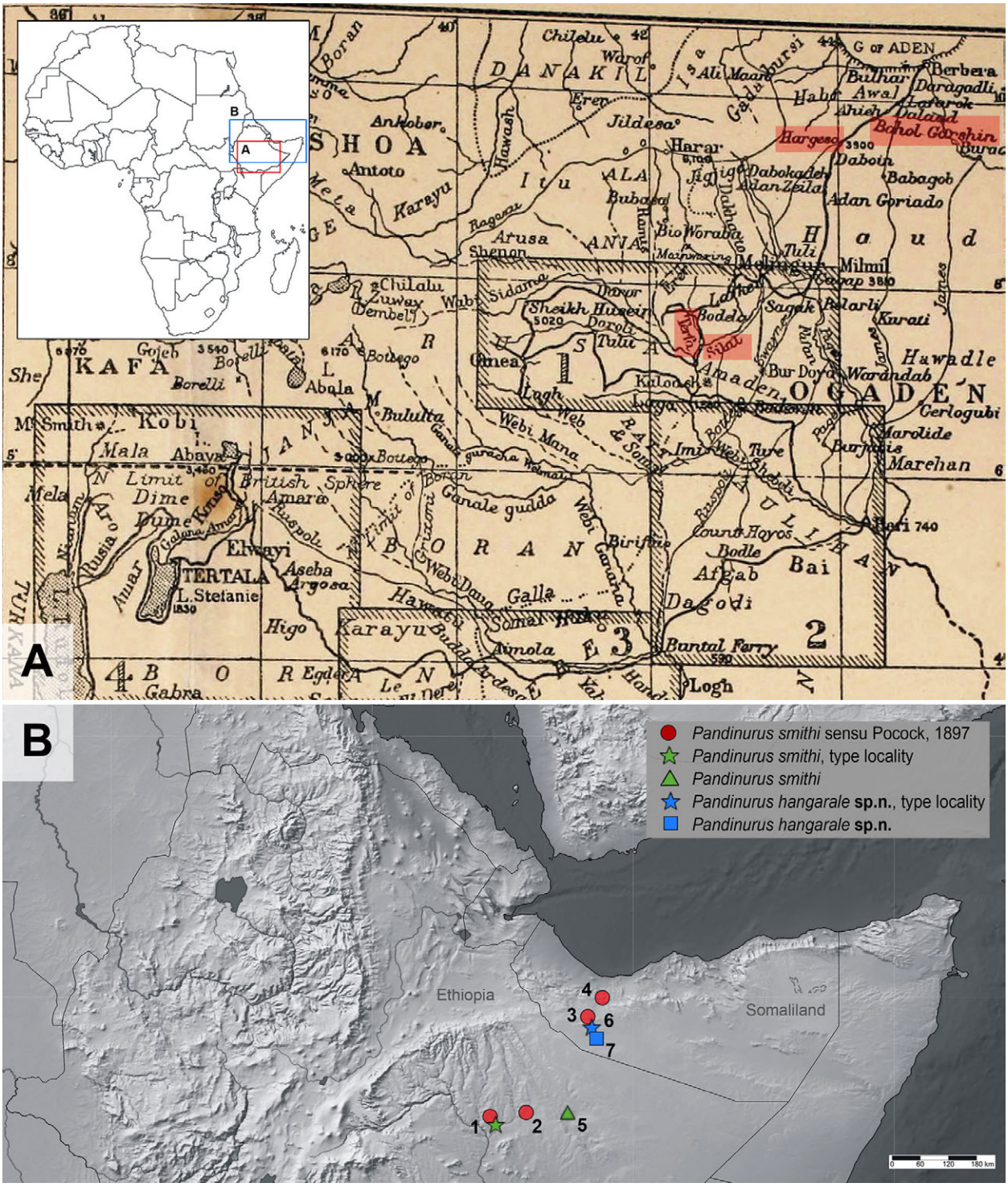


Figure 37: **A**. Map with marked places where types of *P. smithi* were collected, originally published by Smith (1897). **B**. Actual map of Horn of Africa with marked discussed localities. **1–4**. Localities cited by Pocock (1897) except locality "Ahdeh (Abdeh)" which we has not found (**1**. Turfa, type locality of *P. smithi*, **2**. Silul, **3**. Hargesa, **4**. Boholgarshan.). **5–7**. Localities where the first and the third authors collected *Pandinurus* specimens (**5**. Locality 11EV, Ethiopia, 55 km S of Degehbur, 07°49'27.2"N 43°41'56.3"E where was collected a male of *P. smithi*. **6**. Locality 17SE, Somaliland, Toon village near Hargeisa, 09°23'30"N 44°07'10"E, the type locality of *P. hangarale*. **7**. Woqooyi Galbeed, 09°11'56"N 44°09'50"E, between Hargeisa and Salahle, the locality of *P. hangarale* paratype).

nowadays the type locality (Turfa) and the locality Silul are located in Ethiopia while Hargesa (Hargeisa) is the capital of Somaliland (Fig. 37).

We suspect that *Pandinurus smithi* (Pocock, 1897) occurs only in Ethiopia and that the specimens cited by Pocock without a specific locality from Hargesa may belong to a different speices, one described herein as *Pandinurus hangarale* **sp. n.** One remaining unresolved question regards the taxonomic position of a female that Pocock recorded from Silul (now Ethiopia), but that groups with specimens lacking "bright reddish yellow legs", and two immature examples from Ahdeh and Boholgarshan which also were not recently studied.

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References

FET, V. 1997. Notes on the taxonomy of some old world scorpions (Scorpiones: Buthidae, Chactidae, Ischnuridae, Scorpionidae). *The Journal of Arachnology*, 25: 245–250.

FET, V. 2000. Family Scorpionidae Latreille, 1802. Pp. 427–486 *in* Fet, V., W. D. Sissom, G. Lowe & M. E. Braunwalder. *Catalog of the Scorpions of the World* (*1758–1998*). New York: The New York Entomological Society, 689 pp.

KOVAŘÍK, F. 2003. Scorpions of Djibouti, Eritrea, Ethiopia, and Somalia (Arachnida: Scorpiones), with a key and descriptions of three new species. *Acta Societatis Zoologicae Bohemicae*, 67: 133–159.

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. 2011. A review of the subgenus *Pandinus* Thorell, 1876 with descriptions of two new species from Uganda and Ethiopia (Scorpiones, Scorpionidae). *Euscorpius*, 129: 1–18.

KOVAŘÍK, F. 2013. *Pandinus* (*Pandinus*) *trailini* sp. n. from Ethiopia (Scorpiones, Scorpionidae) with data on localities and life strategy. *Euscorpius*, 163: 1−14.

KOVAŘÍK, F. 2017. Scorpions of the Horn of Africa (Arachnida, Scorpiones). Part XI. *Pandinurus kmoniceki* sp. n. (Scorpionidae) from Somaliland. *Euscorpius*, 243: 1–14.

KOVAŘÍK, F., G. LOWE, K. B. RANAWANA, D. HOFEREK, V. A. SANJEEWA JAYARATHNE, J. PLÍŠKOVÁ & F. ŠŤÁHLAVSKÝ. 2016. Scorpions of Sri Lanka (Arachnida, Scorpiones: Buthidae, Chaerilidae, Scorpionidae) with description of four new species of the genera *Charmus* Karsch, 1879 and *Reddyanus* Vachon, 1972 stat. n.. *Euscorpius*, 220: 1–133.

KOVAŘÍK, F., G. LOWE, M. E. SOLEGLAD & J. PLÍŠKOVÁ. 2017. Scorpions of the Horn of Africa (Arachnida, Scorpiones). Part X. *Pandiborellius* stat. n. and *Pandinurus* (Scorpionidae) with description of four new species from Eritrea and Ethiopia, and review of *Pandinus* sensu lato taxonomy. *Euscorpius*, 238: 1–103.

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.

KOVAŘÍK, F., F. ŠŤÁHLAVSKÝ, T. KOŘÍNKOVÁ, J. KRÁL & T. VAN DER ENDE. 2009. *Tityus ythieri* Lourenço, 2007 is a synonym of *Tityus magnimanus* Pocock, 1897 (Scorpiones: Buthidae): a combined approach using morphology, hybridization experiments, chromosomes, and mitochondrial DNA. *Euscorpius*, 77: 1–12.

KRAEPELIN, K. 1903. Scorpione und Solifugen Nordost-Afrikas, gesammelt 1900 und 1901 von Carlo Freiherrn von Erlanger und Oscar Neumann.

Zoologische Jahrbücher, *Abtheilung für Systematik*, 18(4–5): 557–578.

LAMORAL, B. H. 1979. The scorpions of Namibia (Arachnida: Scorpionida). *Annals of the Natal Museum*, 23 (3): 497–784.

PLÍŠKOVÁ, J., F. KOVAŘÍK, O. KOŠULIČ & F. ŠŤÁHLAVSKÝ. 2016. Description of a new species of *Heterometrus* Ehrenberg, 1828 (Scorpiones: Scorpionidae) from Thailand with remarks about the utilization of cytogenetic data in taxonomy of the genus. *Annales Zoologici* (Warszava). 66(3): 467–476.

POCOCK, R. I. 1897. Solifugae, Scorpiones, Chilopoda, and Diplopoda. The first expedition from Somaliland to Lake Lamu. *Appendix C to Donaldson Smith`s Through Unknown African Countries*, *Greenwood Press*, *Publishers*, *New York*, 1897: 392–407.

POCOCK, R. I. 1900. On a collection of insects and arachnids made in 1895 and 1897 by Mr. C. A. V.Peel, F. Z. S. in Somaliland, with descriptions of new species. 10. General list of the scorpions of Somaliland and the Boran Country. *Proceedings of the Zoological Society of London*, 1900: 55–63.

SAKAMOTO, Y. & A. A. ZACARO. 2009. LEVAN, an ImageJ plugin for morphological cytogenetic analysis of mitotic and meiotic chromosomes. Available at: http://rsbweb.nih.gov/ij/plugins/levan/levan.html. Accessed 3rd June 2016.

SMITH, A. D. 1897. *Through Unknown African Countries; the First Expedition from Somaliland to Lake Lamu*. London: Edward Arnold. 471 pp.

STAHNKE, H. L. 1971. Scorpion nomenclature and mensuration. *Entomological News*, 81: 297–316.

STOCKWELL, S. A. 1989. *Revision of the Phylogeny and Higher Classification of Scorpions* (*Chelicerata*). Ph.D. Dissertation, University of Berkeley, Berkeley, California. 319 pp. (unpublished). University Microfilms International, Ann Arbor, Michigan.

VACHON, M. 1974. Études des caractères utilisés pour classer les familles et les genres des scorpions (Arachnides). 1. La trichobothriotaxie en arachnologie. Sigles trichobothriaux et types de trichobothriotaxie chez les Scorpions. *Bulletin du Muséum national d'Histoire naturelle*, 3e série, 140 (Zoologie, 104): 857–958.