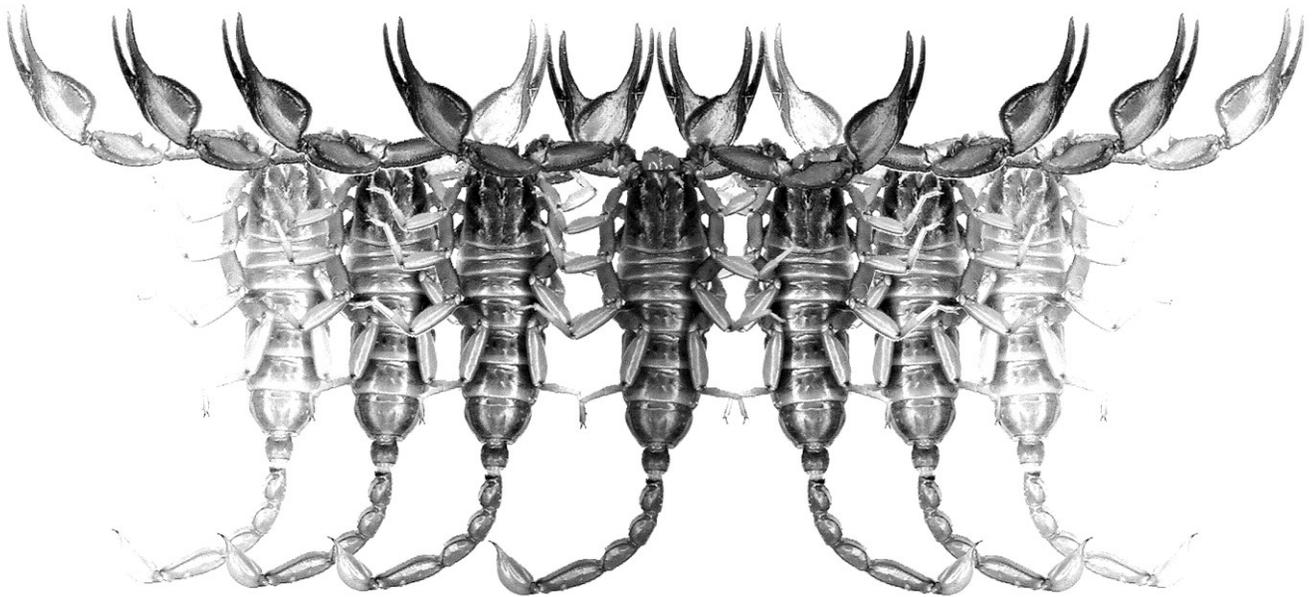


Euscorpium

Occasional Publications in Scorpiology



Pandinus (Pandinus) trailini sp. n. from Ethiopia
(Scorpiones: Scorpionidae), with Data on
Localities and Life Strategy

František Kovařík

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***Pandinus (Pandinus) trailini* sp. n. from Ethiopia
(Scorpiones: Scorpionidae), with data on localities and
life strategy**

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Summary

Pandinus (Pandinus) trailini sp. n. from Ethiopia is described and compared with other species of the subgenus. The new species is characterized by 6/4: 6-7/4: 7-8/4-5: 7-8/4-5 spination formula of tarsomere II and only two spines on the inclined anteroventral surface of tarsomere II; 16–18 ventral trichobothria on the chela; and sexual dimorphism, with the male having a more pronounced tooth on the movable finger of pedipalp than the female. A key to species and a distribution map of the subgenus *Pandinus* Thorell, 1876 are provided. Presented are also photos of localities.

Introduction

Our knowledge of the genus *Pandinus* was summarized by Kovařík (2009), but that work was based primarily on morphology of old museum specimens. Since then I have had an opportunity to participate in expeditions to eastern Africa and to publish articles that apart from descriptions of new species contain also first data on life strategies and localities of the *Pandinus* subgenera *Pandinus* (see Kovařík, 2011) and *Pandinurus* (see Kovařík, 2012). Also the last (third) expedition to the region allowed me to further study the life strategies of the genus, perhaps the most surprising observation being that the young live with their mother as long as after the fourth ecdysis. This observation is discussed and illustrated below.

Systematics

Pandinus Thorell, 1876
(Figs. 1–36)

Pandinus Thorell, 1876: 12; Kraepelin, 1899: 116; Vachon, 1974: 953, figs. 113-118; Sissom, 1990: 136; Fet, 1997: 248; Fet, 2000: 465; Prendini, 2000: 44; Kovařík, 2009: 50, figs. 284-420; Kovařík, 2011: 1, figs. 1-42; Kovařík, 2012: 3, figs. 1-64.

TYPE SPECIES. *Buthus imperator* C. L. Koch, 1841.

DIAGNOSIS. Total length 60–220 mm. Pedipalp femur with 3 trichobothria, only one of them on internal surface. Pedipalp patella with 13–19 external and numerous (usually 30–40) ventral trichobothria. Retrolateral pedal spurs absent. Lateroapical margins of tarsi produced into rounded lobes. Metasomal segments I–IV with paired ventral submedian carinae. Stridulatory organ located on opposing surfaces of pedipalp coxa and first leg. Telson without subaculear tubercle.

Subgenus *Pandinus* Thorell, 1876
(Figs. 1–36)

Pandinus (Pandinus): Vachon, 1974: 953; Fet, 2000: 466; Kovařík, 2009: 56, figs. 386-402, 414-417; Kovařík, 2011: 1, figs. 1-42.

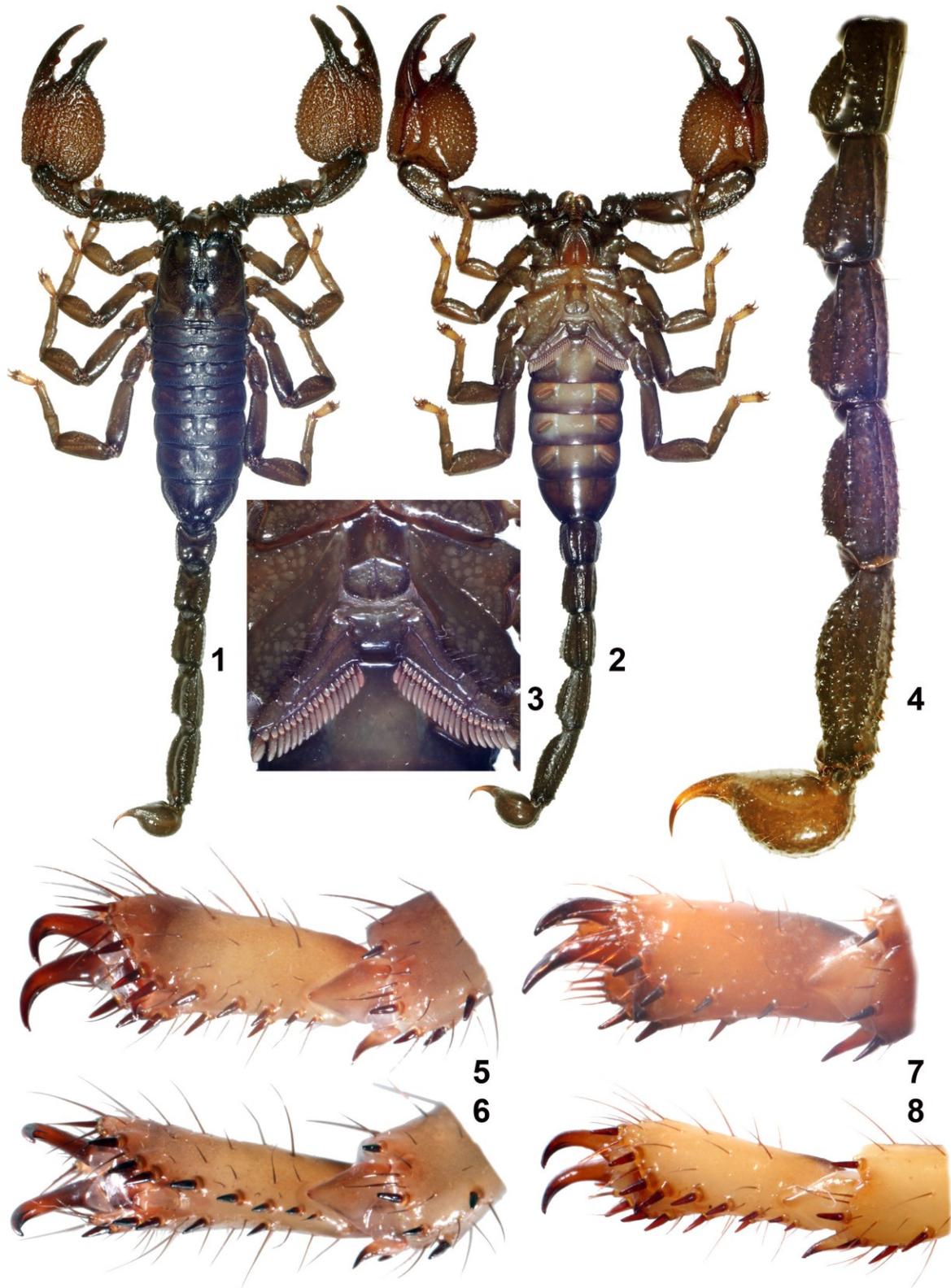
TYPE SPECIES. *Buthus imperator* C. L. Koch, 1841.

DIAGNOSIS. Total length 90–220 mm. Chela with 3 internal and 8–18 ventral trichobothria. Pectinal teeth number 10–21.

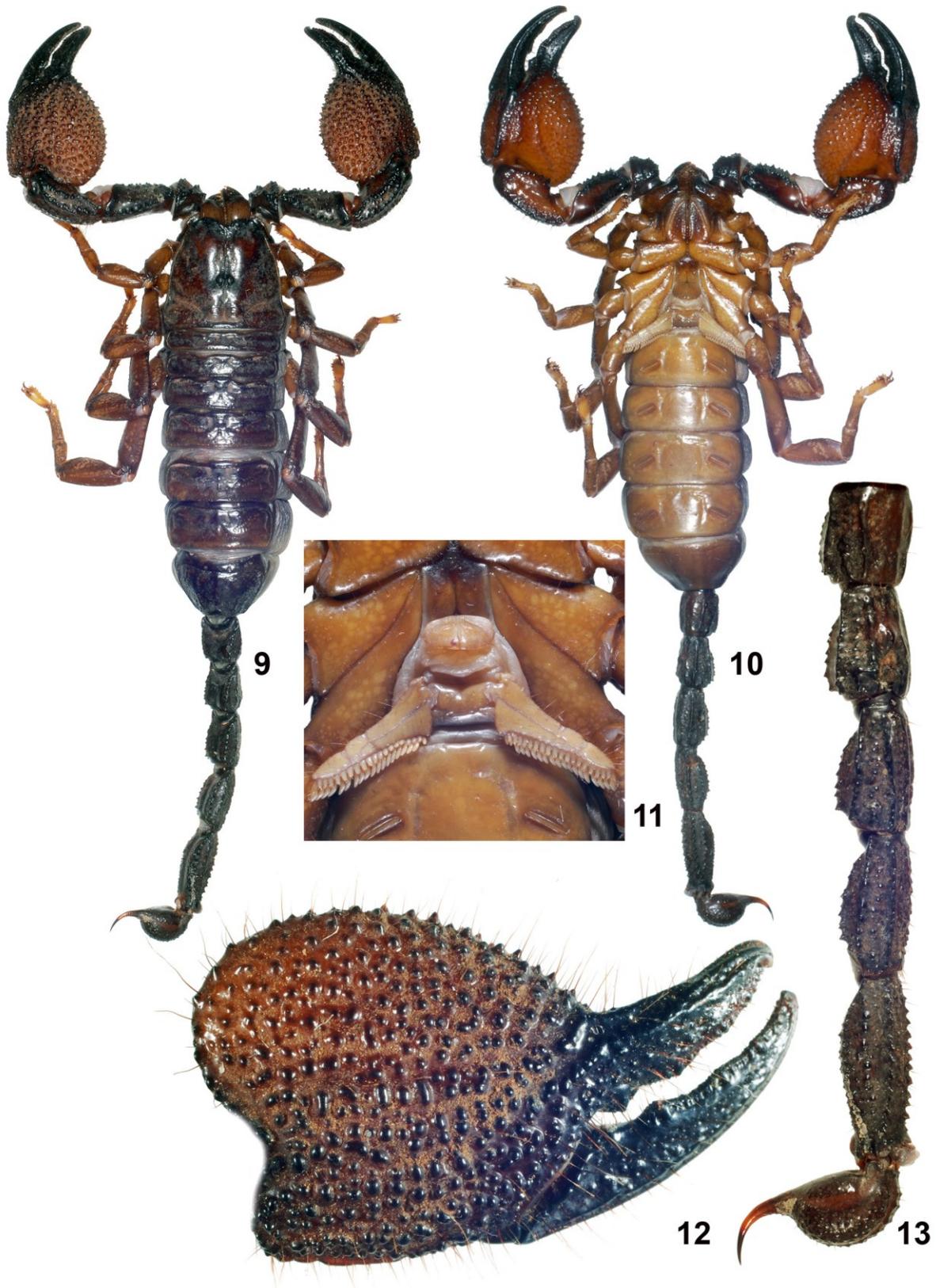
Pandinus (Pandinus) trailini sp. n.
(Figs. 1–6, 9–36)

<http://zoobank.org/urn:lsid:zoobank.org:act:E01BCA9A-F57C-4EC5-B4F8-7034BBF1898B>

TYPE LOCALITY AND TYPE DEPOSITORY. Ethiopia, Oromia State, Arsi Province, 06°56'06"N 40°41'23"E,



Figures 1–8: 1–6: *Pandinus trailini* sp. n., ♂ holotype. 1–2. Dorsal and ventral views. 3. Pectinal area. 4. Metasoma and telson, lateral view. 5–6. Tarsomere II of 4th leg, lateral and ventral views. 7: *Pandinus ugandaensis* Kovarik, 2011, ♂ holotype, tarsomere II of 4th leg. 8: *Pandinus smithi* (Pocock, 1897), ♂ (107 mm), Ethiopia, 55 km of Degebur, 07°49'27.2"N 43°41'56.3"E, 1053 m a.s.l., FKCP, tarsomere II of 4th leg.



Figures 9–13: *Pandinus trailini* sp. n., ♀ (116 mm) paratype. 9–10. Dorsal and ventral views. 11. Pectinal area. 12. Chela dorsoexternal view. 13. Metasoma and telson, lateral view.

1693 m a.s.l. (Locality No. 13EA); the author's collection (FKCP).

TYPE MATERIAL. **Ethiopia**, Oromia State, Arsi Province, 06°56'06"N 40°41'23"E, 1693 m a.s.l. (Locality No. 13EA), 5.VII.2012, 1♂ (holotype) and its exuvia from 20.I.2013, leg. V. Trailin, 24.VI.2013, 1♀10 juvs after 3rd and 4th ecdyses (paratypes), leg. F. Kovařík, J. Plíšková, P. Novák; Oromia State, Arsi Province, 06°54'19"N 40°50'08"E, 1708 m a.s.l. (Locality No. 13EB), 24.VI.2013, 4♀1im.12juvs. (paratypes), leg. F. Kovařík, J. Plíšková, P. Novák, V. Socha; Oromia State, Arsi Province, Sof Omar, 06°54'19"N 40°51'04"E, 1200 m a.s.l. (Locality No. 13EC), 24.-25.VI.2013, 3♀ 1im.1juv. (paratypes) (UV detection), leg. F. Kovařík, J. Plíšková, P. Novák.

Most of adult specimens are in 75% alcohol, only two females from locality No. 13EC and all juveniles are still alive. All type specimens are in FKCP collection. Other females and juveniles from locality No. 13EC that were found associated with the types but not included in the type series are kept alive and cared for by Jana Plíšková, Pavel Novák, Vít Socha, and Vladimír Trailin.

ETYMOLOGY. Named after Vladimír Trailin, a Czech herpetologist and my friend, who visited Ethiopia with me.

DIAGNOSIS. Total length 98–116 mm. Color uniformly brown to reddish black, only chela reddish brown. Chelicerae brown, reticulate, with black fingers and anterior margin. External trichobothria on patella number 17–19 (5–6 *eb*, 3 *esb*, 2 *em*, 1 *est*, 6–7 *et*); ventral trichobothria on chela number 16–18. Carapace lacking carinae and with very fine sparse granules. Dorsal carinae on first through fourth metasomal segments terminate in a larger tooth most conspicuous on fourth segment. Spination formula of tarsomere II = 6/4: 6-7/4: 7-8/4-5: 7-8/4-5. Tarsomere II with 2 spines on inclined anteroventral surface. Pectinal teeth number 16–20. Pedipalps densely hirsute, mainly chela. Granules on dorsal surface of chela conical, conspicuous but not pointed. External surface of chela with conical granules in anterior part and without carinae. Length to depth ratio of 4th metasomal segment = 1.73–2.02. Male has more pronounced tooth on movable finger of pedipalp and slightly larger telson than female.

DESCRIPTION. The adult male holotype is 107 mm long, and female paratypes are 98–116 mm long. The habitus is shown in Figs. 1–2 and 9–10. For position and distribution of trichobothria of pedipalps see Figs. 14–20. External trichobothria on the patella number 17–19 (5–6 *eb*, 3 *esb*, 2 *em*, 1 *est*, 6–7 *et*); ventral trichobothria on the chela number 16–18. The male has a more pronounced tooth on the movable finger of pedipalp

(Fig. 14 versus Fig. 12) and a slightly larger telson than the female (Fig. 4 versus Fig. 12).

COLORATION (Figs. 1–2). The carapace, mesosoma, metasoma and femur and patella of pedipalp are uniformly brown to reddish black. The chela is reddish brown and its fingers are black. The legs and telson are grayish brown to black. The chelicerae are brown, reticulate, with black fingers and anterior margins.

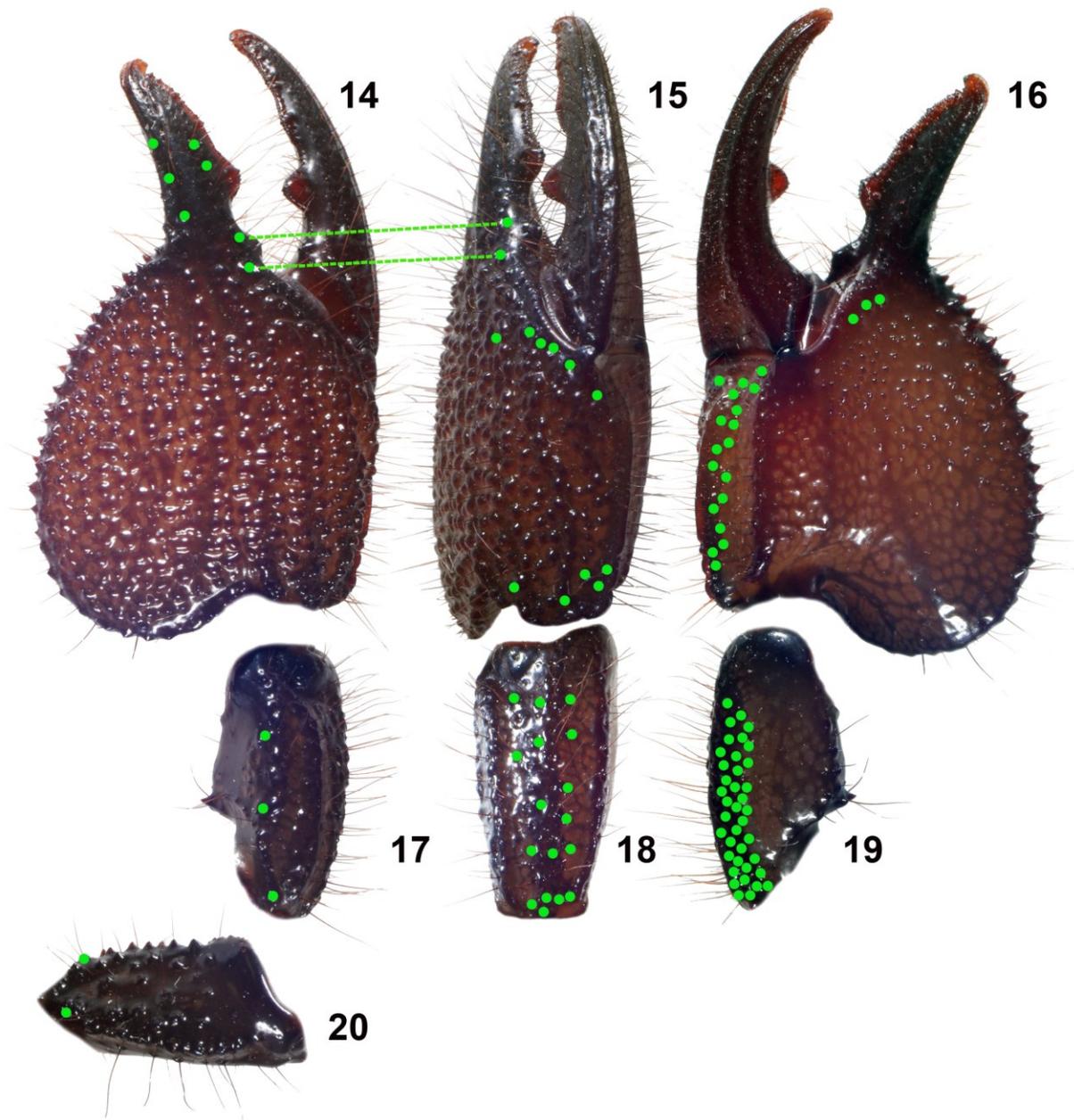
CARAPACE. The carapace lacks carinae but has a deep sagittal furrow with a forked, Y-shaped furrow on each side in the posterior part. The surface is granulated by very fine, sparse granules, but the anterior part is smooth, without granules. The anteromedial margin is strongly concave. Present are a pair of median eyes and three lateral eyes on each side, with a furrow behind the lateral eyes. The distance ratio of the pair of median eyes from the anterior and the posterior margin of the carapace is, respectively, 0.56 and 0.44.

MESOSOMA. The tergites are finely granulated, each with an incomplete sagittal carina and symmetrical shallow furrows. The sternites are smooth, lack carinae and each bears two pronounced furrows that reach neither anterior nor posterior margins. The pectinal teeth number 16–20. The pectines have three marginal and three middle lamellae, all with numerous reddish setae. The characteristic fulcra are long and bear 12 to 20 white setae on the tip.

METASOMA AND TELSON (Fig. 4). The first through fourth segments bear eight carinae. The first through third segments bear smooth ventral and lateral carinae; the fourth segment bears these carinae with several smooth teeth. The dorsal carinae on the first through fourth segments terminate in a larger tooth most conspicuous on the fourth segment. The fifth segment bears five carinae and a row of granules on the lateral surfaces, which may form an incomplete carina. All carinae on the fifth metasomal segment bear strong granules. The surface between the carinae is granulate on the fifth segment and smooth on the other segments. The densely hirsute telson is bulbous (male), with aculeus shorter than the vesicle. The surface of the telson is unevenly granulated and bears incomplete carinae.

LEGS. The legs are smooth, without carinae and granules, and unevenly hirsute. Tarsomere I is hirsute. Tarsomere II has two spines on the inclined anteroventral surface. The spination formula of tarsomere II is 6/4: 6-7/4: 7-8/4-5: 7-8/4-5 (Figs. 5–6).

PEDIPALPS. The pedipalps are densely hirsute, mainly the chela (Figs. 14–16). The femur and patella are bumpy with several large granules. The femur bears four carinae composed of several large, round granules, only the exteroventral carina is smooth. The patella bears four to five smooth and incomplete carinae without granules. Two large and several small granules are only on the external surface of the patella. The chela (Figs. 12 and 14) has a lobe and lacks carinae; its dorsal surface



Figures 14–20: *Pandinus trailini* sp. n., ♂ holotype, trichobothrial pattern. 14. Chela dorsal. 15. Chela external. 16. Chela ventral. 17. Patella dorsal. 18. Patella external. 19. Patella ventral. 20. Femur dorsal.

bears conical granules that are conspicuous but not pointed; its external surface bears conical granules only in the anterior part. The dentate margins of the movable and fixed fingers are armed with two parallel rows of denticles extending the entire length of the finger, without external and internal granules but with larger granules which indicate subrows on both fingers.

MEASUREMENTS IN MM. Male holotype. Total length 107; carapace length 13.8, width 14.3; metasoma and telson length 46.8; first metasomal segment length 6.5, width 6.3, depth 4.8; second metasomal segment length

7.0, width 5.5, depth 4.6; third metasomal segment length 7.9, width 5.2, depth 4.7; fourth metasomal segment length 8.5, width 4.7, depth 4.9; fifth metasomal segment length 11.3, width 4.4, depth 4.4; telson length 10.3; telson width 5.6; pedipalp femur length 10.5, width 4.7; pedipalp patella length 10.4, width 5.2; chela length 22.3; manus width 13.3; movable finger length 13.5.

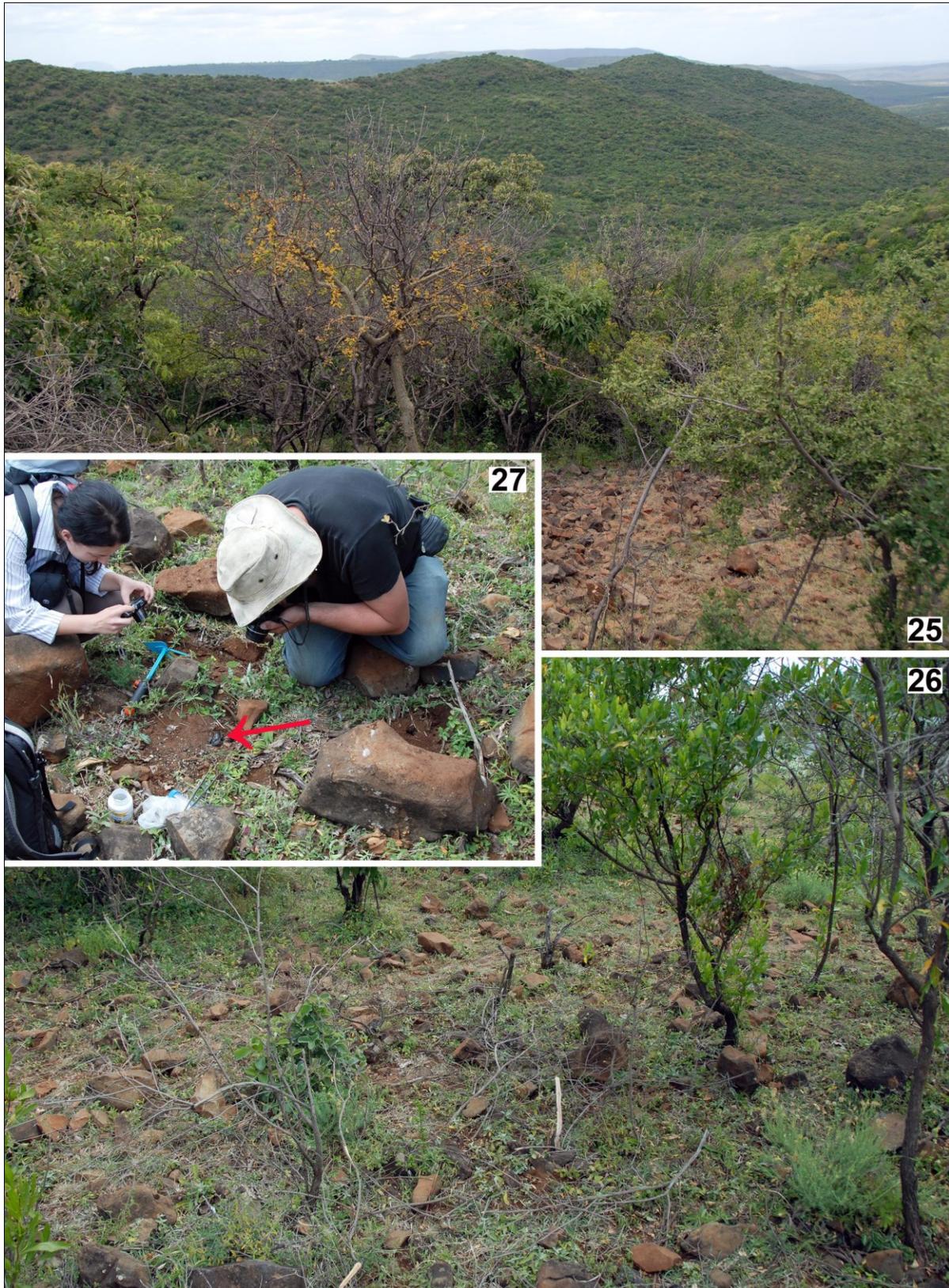
Female paratype. Total length 116; carapace length 15.7, width 16.8; metasoma and telson length 52.6; first metasomal segment length 6.5, width 6.2, depth 4.7;



Figures 21–22: *Pandinus trailini* sp. n., ♂ holotype. 21. Shortly before adulthood (sixth) ecdysis. 22. One day after adulthood ecdysis.



Figures 23–24: *Pandinus trailini* sp. n. 23. Male holotype one month after adulthood ecdysis. 24. Adult female paratype at Locality No. 13EC (Figs. 34–35).



Figures 25–27: *Pandinus trailini* sp. n., type locality, Ethiopia, Oromia State, Arsi Province, 06°56'06"N 40°41'23"E, 1693 m a.s.l. (Locality No. 13EA). 27. Red arrow points to the spot where a female paratype was found together with 10 juveniles. The overturned rock under which the female was found is to the right.



Figures 28–29: *Pandinus trailini* sp. n., Female paratype at type locality. Well apparent are remains of the prey consumed by the female and juveniles. Fig. 29 shows one of the 10 juveniles found with their mother. This juvenile is after the fourth ecdysis.

second metasomal segment length 7.1, width 5.5, depth 4.6; third metasomal segment length 7.5, width 5.0, depth 4.5; fourth metasomal segment length 8.7, width 4.7, depth 4.3; fifth metasomal segment length 11.4, width 4.3, depth 4.5; telson length 11.4; telson width 4.8; pedipalp femur length 10.7, width 5.1; pedipalp patella length 11.5, width 5.7; chela length 24.2; manus width 14.5; movable finger length 15.3.

AFFINITIES. The described features distinguish *P. trailini* **sp. n.** from all other species of the subgenus *Pandinus* Thorell, 1876. *P. trailini* **sp. n.** is characterized by 6/4: 6-7/4: 7-8/4-5: 7-8/4-5 spination formula of tarsomere II and sexual dimorphism, when the male has a more pronounced tooth on the movable finger of pedipalp than the female. These two characters distinguish *P. trailini* **sp. n.** from *P. gambiensis* Pocock, 1899, *P. imperator* (C. L. Koch, 1841), and *P. ugandaensis* Kovařík, 2011 and indicate its close relationship with *P. smithi* (Pocock, 1897) and *P. phillipsii* (Pocock, 1896), which however can be easily distinguished from *P. trailini* **sp. n.** by their yellow legs (see figs. 10–13 in Kovařík, 2011: 5). If this character is omitted, then of these two species *P. trailini* **sp. n.** appears to be closer to *P. smithi*, which however has the tarsomere II of legs with three spines on the inclined anteroventral surface (Fig. 8). *P. trailini* **sp. n.** has only two spines, in place of the third spine there is only a spiniform seta (Fig. 5). The last species of the genus is *P. mazuchi* Kovařík, 2011, whose sexual dimorphism remains unknown. This species can be distinguished from *P. trailini* **sp. n.** by having an additional trichobothrium *ea* (fig. 5a in Kovařík, 2011: 3), different dorsal granulation of the chela (fig. 5a in Kovařík, 2011: 3 versus Fig. 12), sparse pubescence, and having only 10 ventral trichobothria on the chela. *P. trailini* **sp. n.** has 16–18 ventral trichobothria on the chela (Fig. 16), which is the highest number in the subgenus *Pandinus*. *P. gambiensis* has chela with 10 ventral trichobothria, *P. imperator* has 9–14, *P. phillipsii* and *P. smithi* have 13–15, and *P. ugandaensis* has only 8 or 9.

Key to species of the subgenus *Pandinus* Thorell, 1876

1. Spination formula of tarsomere II of 4th leg = 4-6/2-4 (Fig. 7). 5
– Spination formula of tarsomere II of 4th leg = 7-9/4-5 (Figs. 5–6, 8). 2
2. Legs yellow. 3
– Legs not yellow, colored approximately as body (Figs. 23–24). 4
3. Granules on dorsal surface of chela of pedipalp conical and pointed. Tarsomere II with 3 spines on inclined anteroventral surface (Fig. 8)... *P. smithi* (Pocock, 1897)

– Granules on dorsal surface of chela of pedipalp not conical and pointed, their tips may be confluent. Tarsomere II with 2 spines on inclined anteroventral surface. *P. phillipsii* (Pocock, 1896)

4. Granules on dorsal surface of chela of pedipalp not conical, their tips sometimes confluent. Chela with 10 ventral trichobothria. *P. mazuchi* Kovařík, 2011

– Granules on dorsal surface of chela of pedipalp conical (Fig. 14). Chela with 16–18 ventral trichobothria (Fig. 16). *P. trailini* **sp. n.**

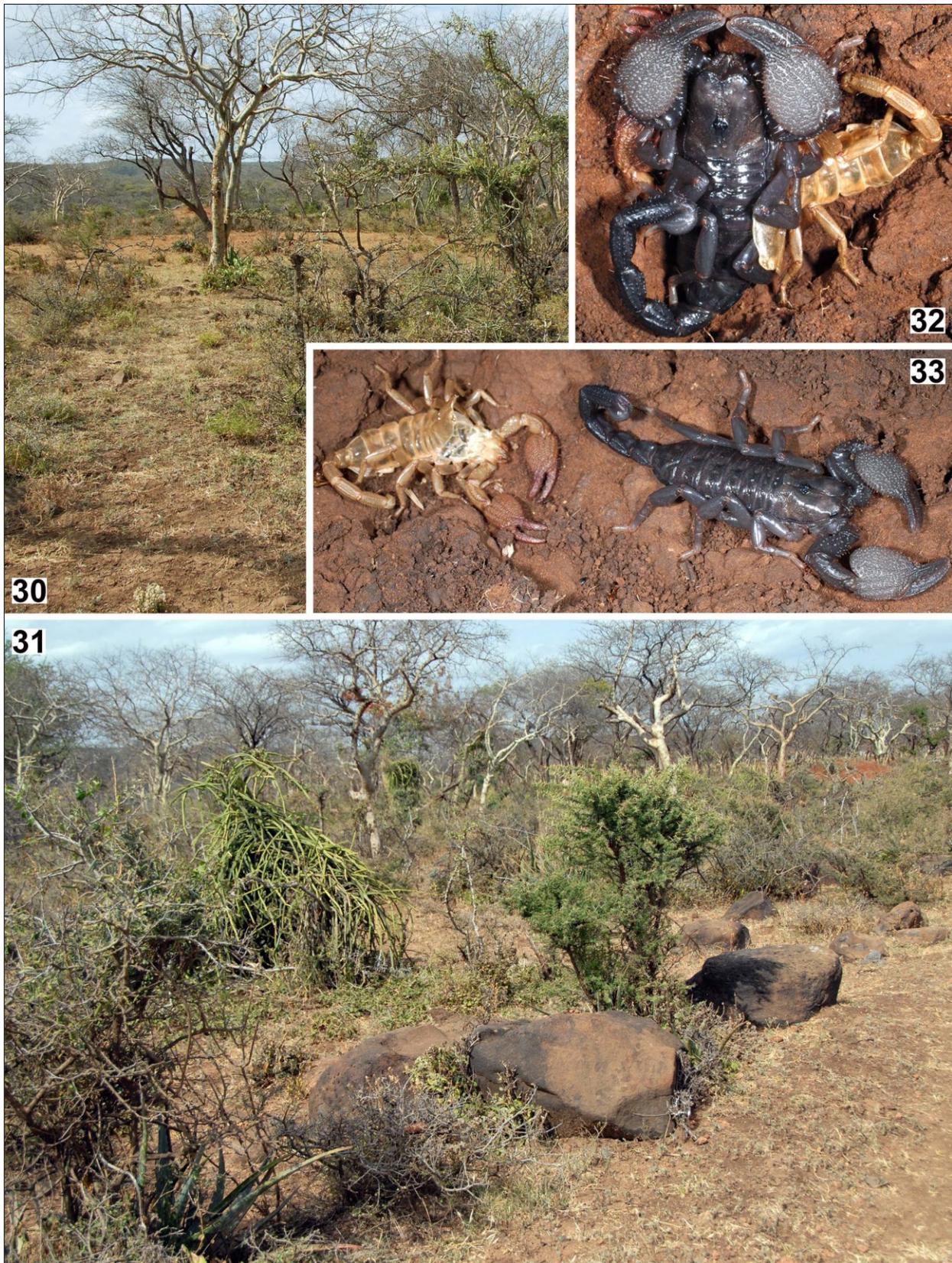
5. Tarsomere II with 3 spines on inclined anteroventral surface. *P. gambiensis* Pocock, 1899

– Tarsomere II with 2 spines on inclined anteroventral surface (Fig. 7). 6

6. Chela with 9–14 ventral trichobothria. Length to depth ratio of 4th metasomal segment greater than 2. *P. imperator* (C. L. Koch, 1841)

– Chela with 8–9 ventral trichobothria (Fig. 29). Length to depth ratio of 4th metasomal segment = 1.6–1.7....
..... *P. ugandaensis* Kovařík, 2011

COMMENTS ON LOCALITIES AND LIFE STRATEGY. The type specimens were collected at three fairly closely spaced localities 1200 to 1708 m a.s.l. The male holotype was found on 5.VII.2012 at the locality labeled here 13EA (Figs. 25–27). At that time it was not quite adult (Fig. 21, total length 80 mm, chela length 16.5 mm) and underwent the adulthood (sixth) ecdysis in captivity on 20.I.2013 (Fig. 22, total length 107 mm, chela length 22.3 mm). We revisited the type locality (13EA) on 24.VI.2013 and at 2 p.m. recorded 36.8°C and 33% humidity. A female paratype was found at the same locality under a rock (Fig. 27) together with 10 juveniles of which two were after the third ecdysis and eight after the fourth ecdysis. The spot contained numerous remains of prey (Figs. 28–29), indicating that the female lived there with the young for quite some time. At the second locality (13EB, Figs. 30–31) we found four females of which two had six juveniles each, all after the second ecdysis. Also found there was a juvenile just after the fifth ecdysis, living separately under a large rock (Figs. 32–33). At the third locality (13EC, Figs. 34–35), where we spent the night, we collected before the sunset and were finding juveniles after the third and fourth ecdyses, living under rocks either in small groups or separately. It appears that the juveniles become fully independent no later than before the fifth ecdysis. In contrast to other scorpions inhabiting the area, at night collecting (UV detections) we were not finding specimens of *P. trailini* **sp. n.** in the open but always with most of the body hidden inside fissures (Fig. 35) or burrows at edges of rocks, and their reaction to UV light was to completely retreat into the hiding place. At the last locality in the



Figures 30–33: *Pandinus trailini* sp. n. **30–31.** Locality No. 13EB, Oromia State, Arsi Province, 06°54'19"N 40°50'08"E, 1708 m a.s.l. Specimens were found under large rocks apparent in Fig. 31. **32–33.** Juvenile after the fifth ecdysis and its exuvia.



Figures 34–35: *Pandinus trailini* sp. n., locality No. 13EC, Oromia State, Arsi Province, Sof Omar, 06°54'19"N 40°51'04"E, 1200 m a.s.l. Most specimens were found in rock fissures.

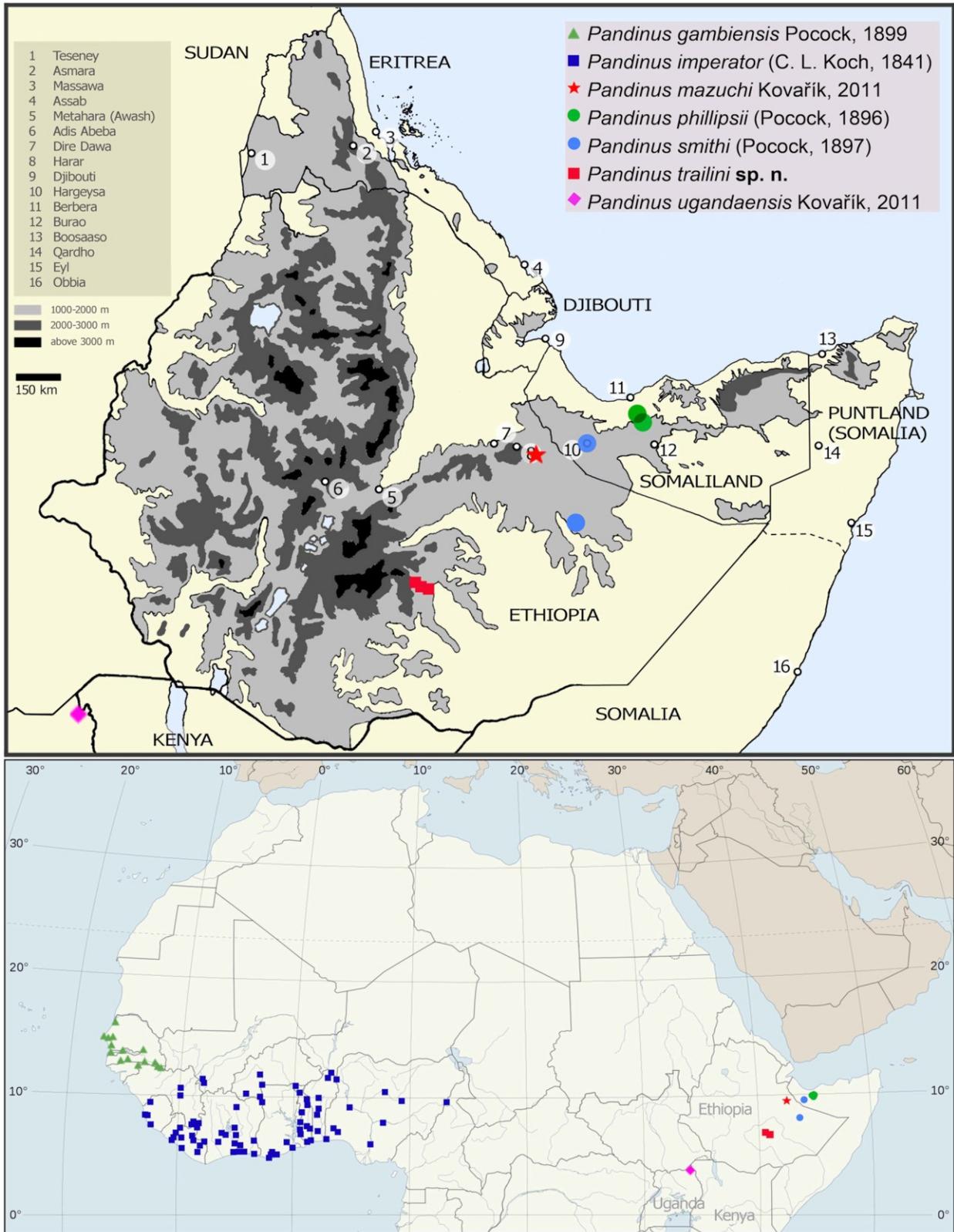


Figure 36: Distribution map of the subgenus *Pandinus*. Localities of *P. imperator* and *P. gambiensis* are after Prendini (2004: 255, fig. 13), localities of other species are after Kovařík (2011).

valley formed by the Gestro River (Fig. 34) we recorded on 24.-25.VI.2013 at night, when *P. trailini* sp. n. became active, from 19.4°C shortly after sunset down to 15.6°C (minimum temperature) before sunrise and up to 69% humidity.

Apart from *P. trailini* sp. n., a scorpion common at all three localities was *Hottentotta trilineatus* (Peters, 1862) (it is the northernmost verified occurrence of this species), and at the locality 13EC we night-collected with UV light *Babycurus* sp. (close to *Babycurus subpunctatus* Borelli, 1925).

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