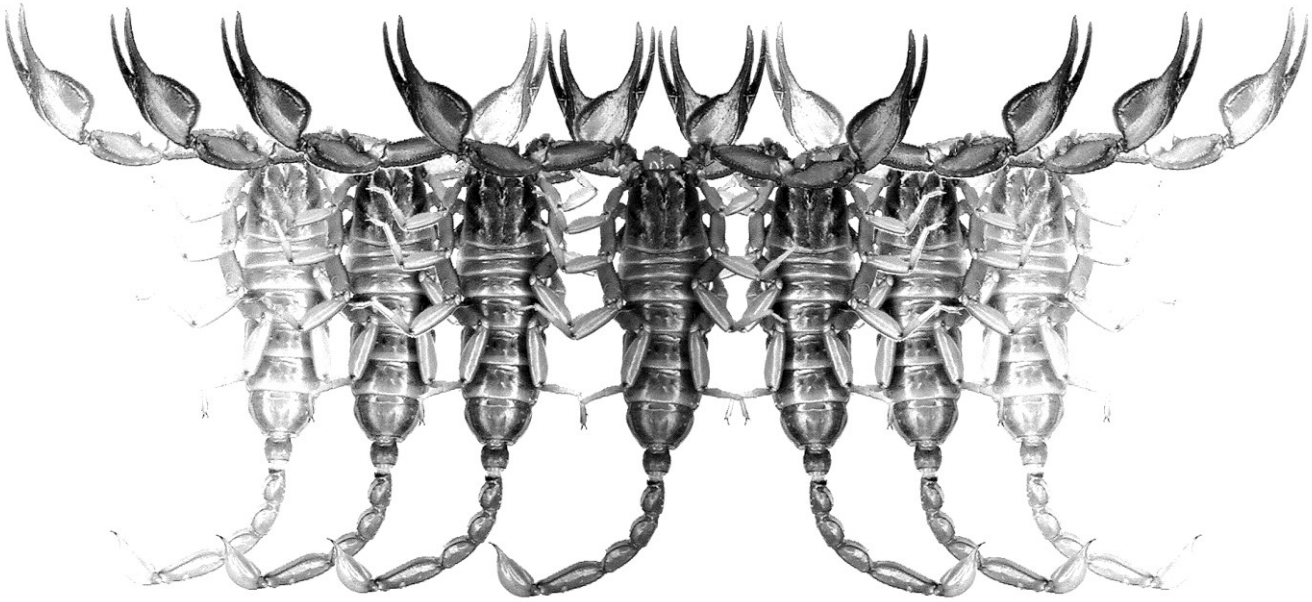
Euscorpius

Occasional Publications in Scorpiology



Scorpions of Ethiopia. Part IV. Genus *Uroplectes* Peters, 1861 (Scorpiones: Buthidae)

František Kovařík, Graeme Lowe, David Hoferek, Jana Plíšková & František Šťáhlavský

January 2016 — No. 217

Euscorpius

Occasional Publications in Scorpiology

EDITOR: Victor Fet, Marshall University, 'fet@marshall.edu'
ASSOCIATE EDITOR: Michael E. Soleglad, 'soleglad@znet.com'

Euscorpius is the first research publication completely devoted to scorpions (Arachnida: Scorpiones). ***Euscorpius*** takes advantage of the rapidly evolving medium of quick online publication, at the same time maintaining high research standards for the burgeoning field of scorpion science (scorpiology). ***Euscorpius*** is an expedient and viable medium for the publication of serious papers in scorpiology, including (but not limited to): systematics, evolution, ecology, biogeography, and general biology of scorpions. Review papers, descriptions of new taxa, faunistic surveys, lists of museum collections, and book reviews are welcome.

Derivatio Nominis

The name ***Euscorpius*** Thorell, 1876 refers to the most common genus of scorpions in the Mediterranean region and southern Europe (family Euscorpiidae).

Euscorpius is located at: **http://www.science.marshall.edu/fet/Euscorpius**
(Marshall University, Huntington, West Virginia 25755-2510, USA)

ICZN COMPLIANCE OF ELECTRONIC PUBLICATIONS:

Electronic ("e-only") publications are fully compliant with ICZN (*International Code of Zoological Nomenclature*) (i.e. for the purposes of new names and new nomenclatural acts) when properly archived and registered. All ***Euscorpius*** issues starting from No. 156 (2013) are archived in two electronic archives:

- **Biotaxa,** http://biotaxa.org/Euscorpius (ICZN-approved and ZooBank-enabled)
- **Marshall Digital Scholar**, http://mds.marshall.edu/euscorpius/. (This website also archives all *Euscorpius* issues previously published on CD-ROMs.)

Between 2000 and 2013, ICZN ***did not accept online texts*** as "published work" (Article 9.8). At this time, *Euscorpius* was produced in two ***identical*** versions: online (*ISSN 1536-9307*) and CD-ROM (*ISSN 1536-9293*) (laser disk) in archive-quality, read-only format. Both versions had the identical date of publication, as well as identical page and figure numbers. ***Only copies distributed on a CD-ROM*** from ***Euscorpius*** in 2001-2012 represent published work in compliance with the ICZN, i.e. for the purposes of new names and new nomenclatural acts.

In September 2012, ICZN Article 8. *What constitutes published work*, has been amended and allowed for electronic publications, disallowing publication on optical discs. From January 2013, ***Euscorpius*** discontinued CD-ROM production; only online electronic version (*ISSN 1536-9307*) is published. For further details on the new ICZN amendment, see http://www.pensoft.net/journals/zookeys/article/3944/.

Publication date: 27 January 2016
http://zoobank.org/urn:lsid:zoobank.org:pub:AE9EEC2B-8D5B-4699-B9CE-595C26EB9C1B

Euscorpius — Occasional Publications in Scorpiology. 2016, No. 217

Scorpions of Ethiopia. Part IV. Genus *Uroplectes* Peters, 1861 (Scorpiones: Buthidae)

František Kovařík [1, 3], Graeme Lowe [2], David Hoferek [1], Jana Plíšková [3] & František Šťáhlavský [3]

[1] P. O. Box 27, CZ-145 01 Praha 45, Czech Republic; www. scorpio.cz
[2] Monell Chemical Senses Center, 3500 Market St., Philadelphia, PA 19104-3308, USA
[3] Department of Zoology, Charles University, Viničná 7, CZ-128 44 Praha 2, Czech Republic

http://zoobank.org/urn:lsid:zoobank.org:pub:AE9EEC2B-8D5B-4699-B9CE-595C26EB9C1B

Summary

All data about the distribution of *Uroplectes fischeri* (Karsch, 1879) in Ethiopia and Somalia are summarized. *U. fischeri* is fully illustrated with color photos of habitus and locality. *Uroplectoides abyssinicus* Lourenço, 1998 is discussed and synonymized with *U. fischeri*. Genus *Uroplectoides* Lourenço, 1998 is synonymized with *Uroplectes* Peters, 1861. Hemispermatophore of *U. fischeri* was extracted and illustrated for the first time. In addition to morphological analysis we also describe the karyotype of male *U. fischeri* from Ethiopia (2n=28).

Introduction

In the years of 2011-2015, two of the authors (FK and JP) have had an opportunity to participate in expeditions to the Horn of Africa, study scorpions at 69 Ethiopian localities and publish several articles on this fauna (Kovařík, 2011a, 2011b, 2012, 2013, 2015; Kovařík & Lowe, 2012; Kovařík & Mazuch, 2011, 2015; Kovařík et al., 2013, 2015). This paper is the fourth in a series of articles concerning the distribution of a particular genus in Ethiopia (Horn of Africa) (Kovařík, 2015; Kovařík et al., 2015; Kovařík & Mazuch, 2015).

Uroplectes Peters, 1861 is an African genus which is found from central to southern parts of Africa. The Ethiopian and Somalian localities of *Uroplectes fischeri* (Karsch, 1879) represent the eastern and northern limits of the distribution of this genus.

Methods, Material & Abbreviations

Nomenclature and measurements follow Stahnke (1971), Kovařík (2009), and Kovařík & Ojanguren Affilastro (2013), except for trichobothriotaxy (Vachon, 1974), and sternum (Soleglad & Fet, 2003).

Specimens studied herein are preserved in 80% ethanol. *Depositories*: FKCP (František Kovařík, private collection, Prague, Czech Republic); MZUF (Museo di Storia Naturale dell'Università di Firenze, sezione di zoologia "La Specola", Florence, Italy); ZMHB (Museum für Naturkunde der Humboldt-Universität, Berlin, Germany); ZMUH (Zoologisches Institut und Zoologisches Museum, Universität Hamburg, Germany).

Systematics

Family **Buthidae** C. L. Koch, 1837

Genus ***Uroplectes*** Peters, 1861
(Figs. 1–46, Table 1)

Uroplectes Peters, 1861: 512; Fet & Lowe, 2000: 266 (complete reference list until 1998); Kovařík, 2009: 31.

= *Lepreus* Thorell, 1876: 7 (type species *Lepreus pilosus* Thorell, 1876: 7) (syn. by Kraepelin, 1908: 256).

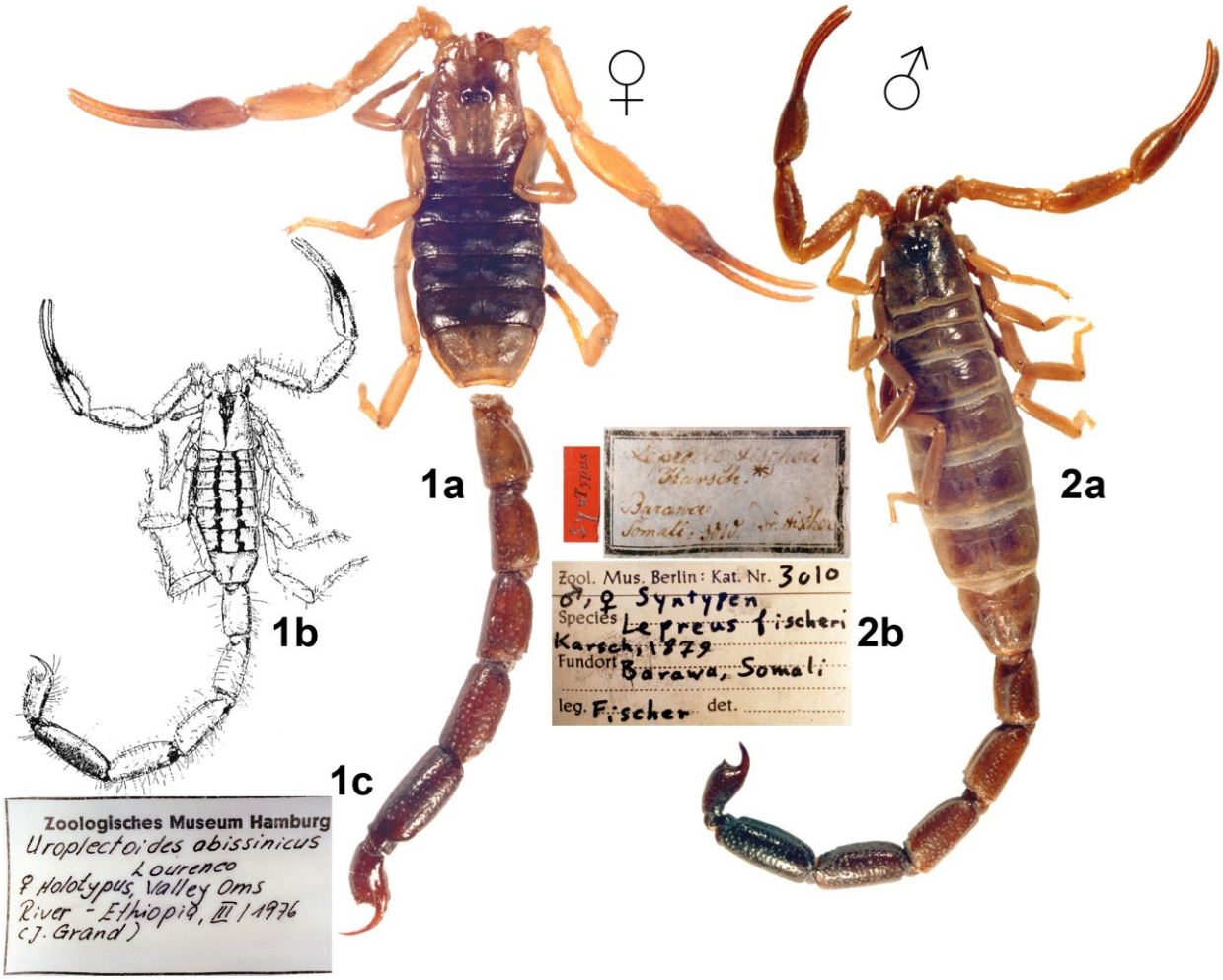
= *Tityolepreus* Kraepelin, 1891: 232 (type species *Tityus chinchoxensis* Karsch, 1879b: 370) (syn. by Kraepelin, 1895: 79, 87).

= *Scorpiobuthus* Werner, 1939: 361 (type species *Scorpiobuthus apatris* Werner, 1939: 361) (syn. by Fet & Sissom, 1997: 408).

= *Uroplectoides* Lourenço, 1998: 313 (type species *Uroplectoides abyssinicus* Lourenço, 1998: 313) **Syn. n.**

TYPE SPECIES. *Uroplectes ornatus* Peters, 1861 (= *Uroplectes flavoviridis* Peters, 1861)

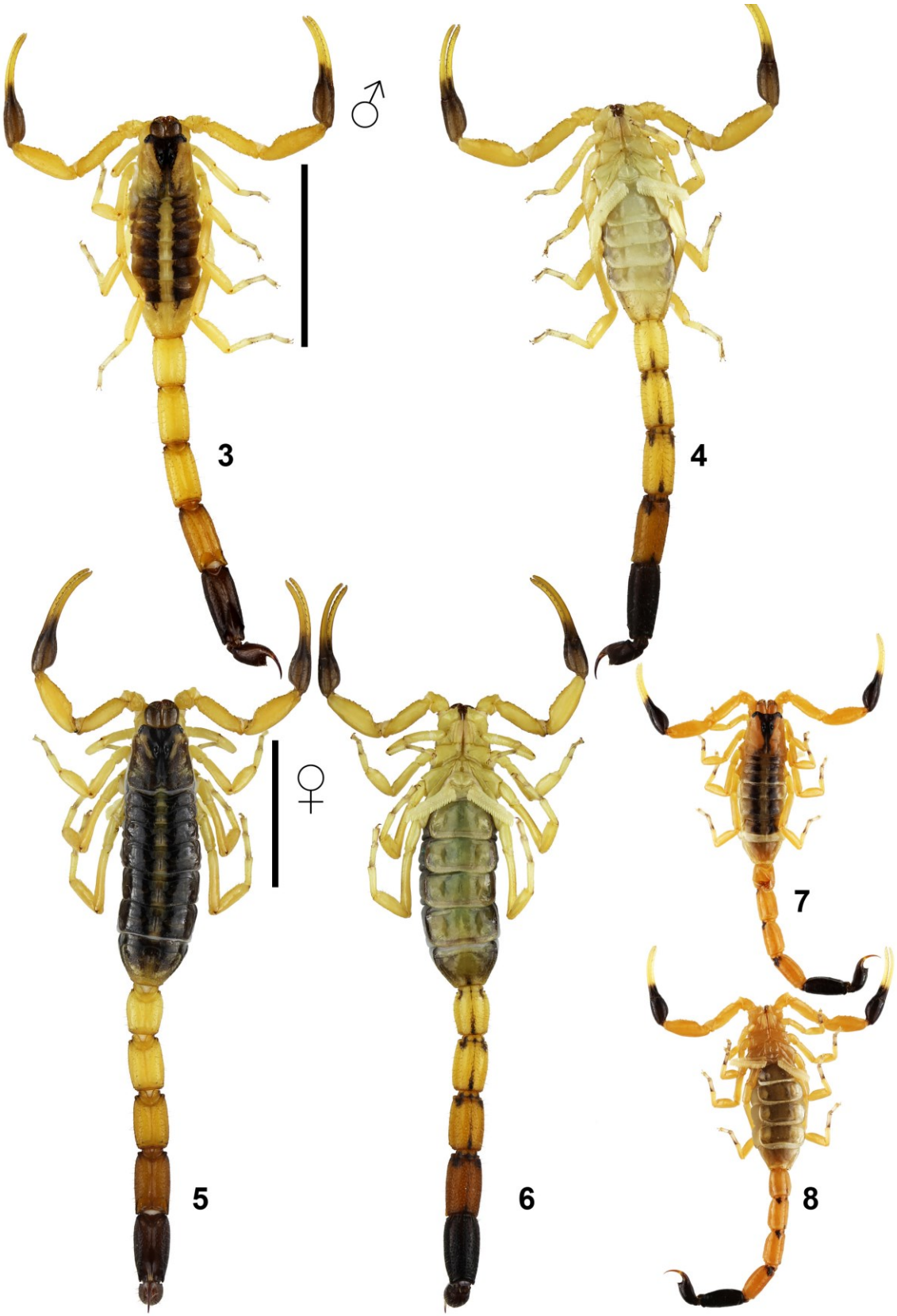
DIAGNOSIS. Medium sized buthids, adults 30–60 mm in length. Sternum *type 1*, subtriangular in shape. Pedipalps



Figures 1–2: Figure 1. Holotype female of *Uroplectoides abyssinicus* Lourenço, 1998, dorsal view (1a), specimen drawn as the female holotype in the original description (1b, fig. 1 in Lourenço, 1998: 310), and original label (1c). **Figure 2**. Lectotype male of *Uroplectes fischeri* (Karsch, 1879), dorsal view (2a) and original labels (2b).

orthobothriotaxic, α-configuration, femur trichobothrium d_2 dorsal, patella trichobothrium d_3 external to DM_c carina. Pectines with fulcra. Median denticle (MD) row of pedipalp chelal finger arranged in oblique groups. Chelicerae with typical buthid dentition, fixed finger smooth, lacking denticles on ventral surface. Tergites I–VI with one or three carinae. Carapace without distinct carinae. Metasoma elongate. Telson with or without subaculear tooth. Legs III and IV with well developed tibial spur.

COMMENTS. We examined the female holotype of the type species *Uroplectoides abyssinicus* Lourenço, 1998 from ZMUH, which is the only known specimen of this species. We found that the female holotype is definitely different from the specimen illustrated as the female holotype in the original description (Figs. 1a–1b, and fig. 1 in Lourenço, 1998: 310). Several years ago, the first author (FK) discussed this problem with H. Dastych, curator at ZMUH, who excluded the possibility of the specimen being mislabeled. The identity of the specimen which we studied and photographed (Fig. 1a) was thus confirmed to be the holotype of *Uroplectoides abyssinicus*. We suggest that the published figure of the holotype female (Fig. 1b) is an error and actually represents the male of another species, maybe from the *Uroplectes vittatus* "complex". Morphometrics of the body and metasomal segments in that figure differ from those of the holotype. Also, the metasoma of the holotype is bent backward, not forward as illustrated in the figure. The narrower body of the illustrated scorpion suggests that it is a male, not a female. Another striking difference is that the holotype shows no trace of the median dark stripe on the carapace and paired dark stripes on the tergites drawn in the figure. Study of the holotype of *Uroplectoides abyssinicus*, lectotype and paralectotype of *Uroplectes fischeri*, and our additional new specimens from Ethiopia reveals that all of these specimens represent the same species, i.e. *Uroplectes fischeri* (= *Uroplectoides abyssinicus* **syn. n.**). Here we also synon-



Figures 3–8: *Uroplectes fischeri* from locality 14EI, Ethiopia, Somali State, Liben region, between Filtu and Dolo Odo, 04°50'07.5"N 40°55'13.5"E, 912 m a.s.l.. Male dorsal (3) and ventral (4) views, female her mother dorsal (5) and ventral (6) views (scale bar 1-cm), and juvenile 17 mm long in dorsal (7) and ventral (8) views.

Figures 9–20: *Uroplectes fischeri* from locality 14EI, Ethiopia, Somali State, Liben region, between Filtu and Dolo Odo, 04°50'07.5"N 40°55'13.5"E, 912 m a.s.l. Male, pedipalp chela, dorsal (9), and external (10), and telson lateral (20) view. Female, pedipalp chela, dorsal (11), external (12), and ventral (13) views. Pedipalp patella, dorsal (14), external (15), and ventral (16) views. Pedipalp femur and trochanter dorsal (17) view. The trichobothrial pattern is indicated in Figures 12a–15a, 17a. Pedipalp movable finger (18) and telson lateral (19) views.

ymize the genera *Uroplectes* Peters, 1861 and *Uroplectoides* Lourenço, 1998. The genus *Uroplectoides*, nominally containing two species (*U. abysinnicus* and *U. emiliae*) was based on the simple conjunction of 3 character states (concave anterior margin of carapace, metasoma with carinae weak and surface smooth with punctuations, telson with strong subaculear tooth) that are actually expressed to varying degrees in other species of *Uroplectes*. This synthetic approach can lead to polyphyletic or paraphyletic groupings. Although we suspect that *Uroplectes* may indeed contain more than one monophyletic lineage that could comprise additional genera, their composition is still unclear and it will be necessary to study more species and perform detailed comparative analyses of characters to define these clades. From a nomenclatural perspective, Lourenço (1998) also ignored three generic names already synonymized under *Uroplectes*. The type species for two of those genera, *Tityolepreus* Kraepelin, 1891 (type species *Tityus chinchoxensis* Karsch, 1879 = *Uroplectes occidentalis* Simon, 1876) and *Scorpiobuthus* Werner, 1939 (type species *Scorpiobuthus apatris* Werner, 1939 = *Uroplectes chubbi* Hirst, 1911) appear to belong to the same species group as the type species of *Uroplectoides* and they share characters cited in the diagnosis of *Uroplectoides*. Hence, these names have precedence over *Uroplectoides*.

Figures 21–26: *Uroplectes fischeri* from locality 14EI, Ethiopia, Somali State, Liben region, between Filtu and Dolo Odo, 04°50'07.5"N 40°55'13.5"E, 912 m a.s.l. Male, metasoma and telson, lateral (21), ventral (22), and dorsal (23) views. Female, metasoma and telson, lateral (24), ventral (25), and dorsal (26) views.

Uroplectes fischeri (Karsch, 1879)
(Figs. 1–46, Table 1)

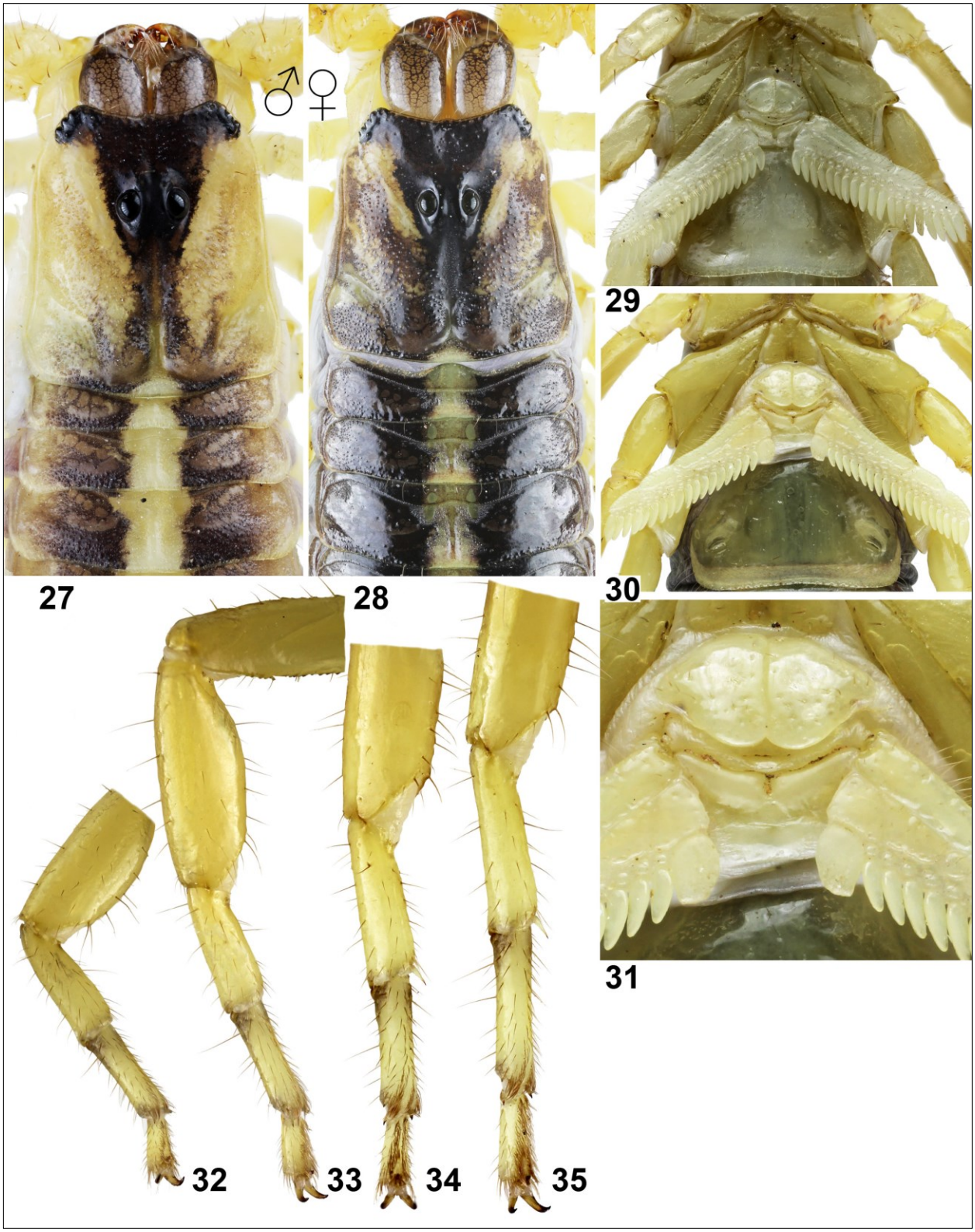
Lepreus fischeri Karsch, 1879a: 124–125.

Uroplectes fischeri: Pocock, 1896: 387–388; Kraepelin, 1903: 566; Lamoral & Reynders, 1975: 527 (in part); Fet & Lowe, 2000: 268–269 (in part, complete reference list until 2000); FitzPatrick, 2001: 192–193; Kovařík, 2003: 145–146, fig. 6; Kovařík & Whitman, 2005: 113.

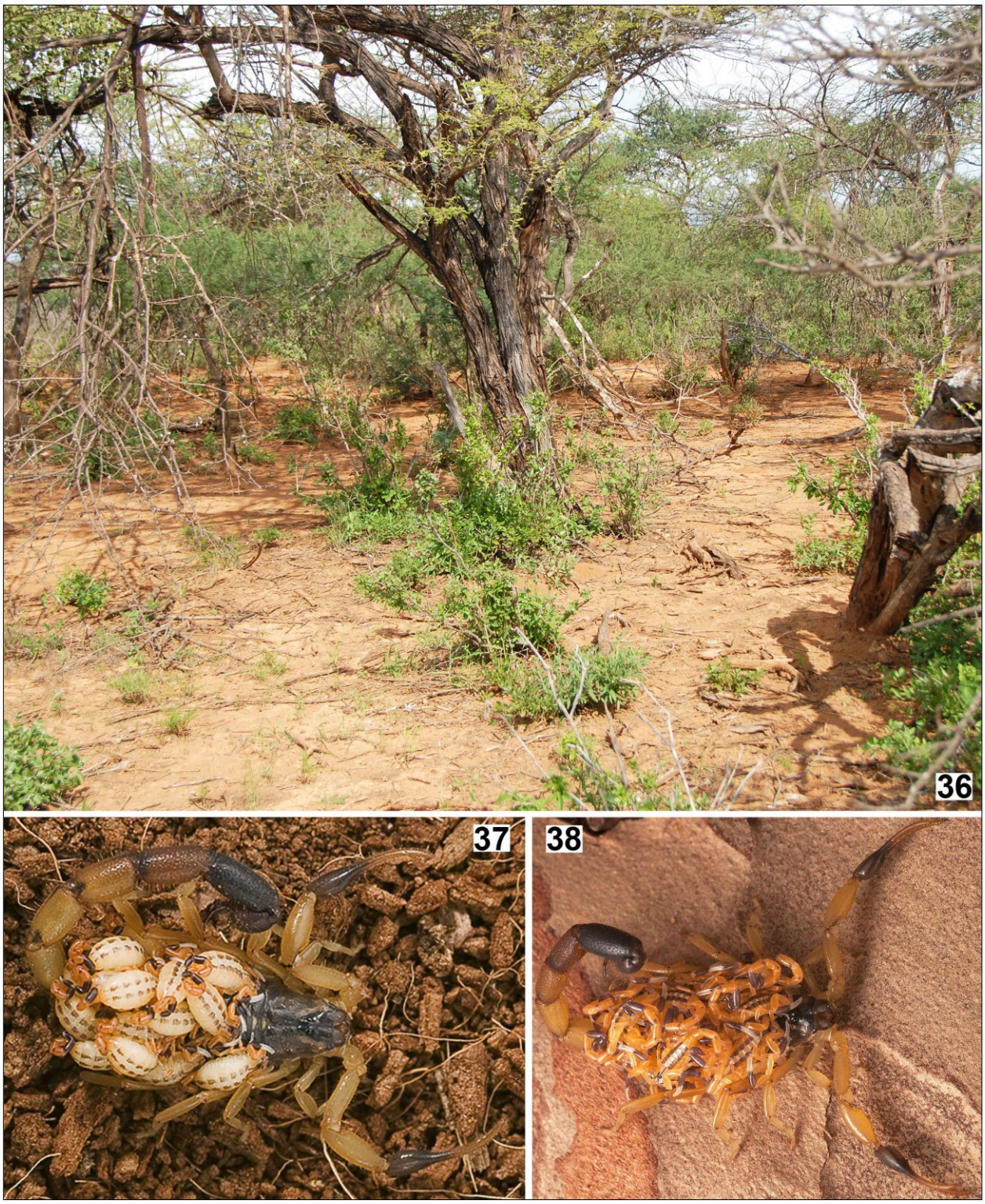
= ? *Tityus tricolor* Simon, 1882: 59 (syn. by Kraepelin, 1899: 57).

= *Uroplectes fischeri caporiaccoi* Fet, 1997: 247, replacement name for *Uroplectes fischeri intermedius* Caporiacco, 1941: 35 (preocc. by *Uroplectes intermedius* Tullgren, 1907: Scorpionida) (syn. by Kovařík, 2003: 145–146).

= *Uroplectes patrizii* Caporiacco, 1936: 137–140, fig. 2 (syn. by Kovařík, 2003: 145–146).



Figures 27–35: *Uroplectes fischeri* from locality 14EI, Ethiopia, Somali State, Liben region, between Filtu and Dolo Odo, 04°50'07.5"N 40°55'13.5"E, 912 m a.s.l. Male, chelicerae, carapace and tergites I–III (27), and sternopectinal region and sternite III (29). Female, chelicerae, carapace and tergites I–III (28), and sternopectinal region (31) include sternite III (30), distal segments of legs I–IV (32–35), retrolateral view.



Figures 36–38: *Uroplectes fischeri*, locality 14EI (36), Ethiopia, Somali State, Liben region, between Filtu and Dolo Odo, 04°50'07.5"N 40°55'13.5"E, 912 m a.s.l. (see also fig. 120 in Kovařík et al., 2015: 27), female with newborn before first ecdysis (37) and female with 16 juveniles after first ecdysis (38) from the locality.

Figures 39–40: *Uroplectes fischeri*, female at the locality 14EI (39) and male (40), her son.

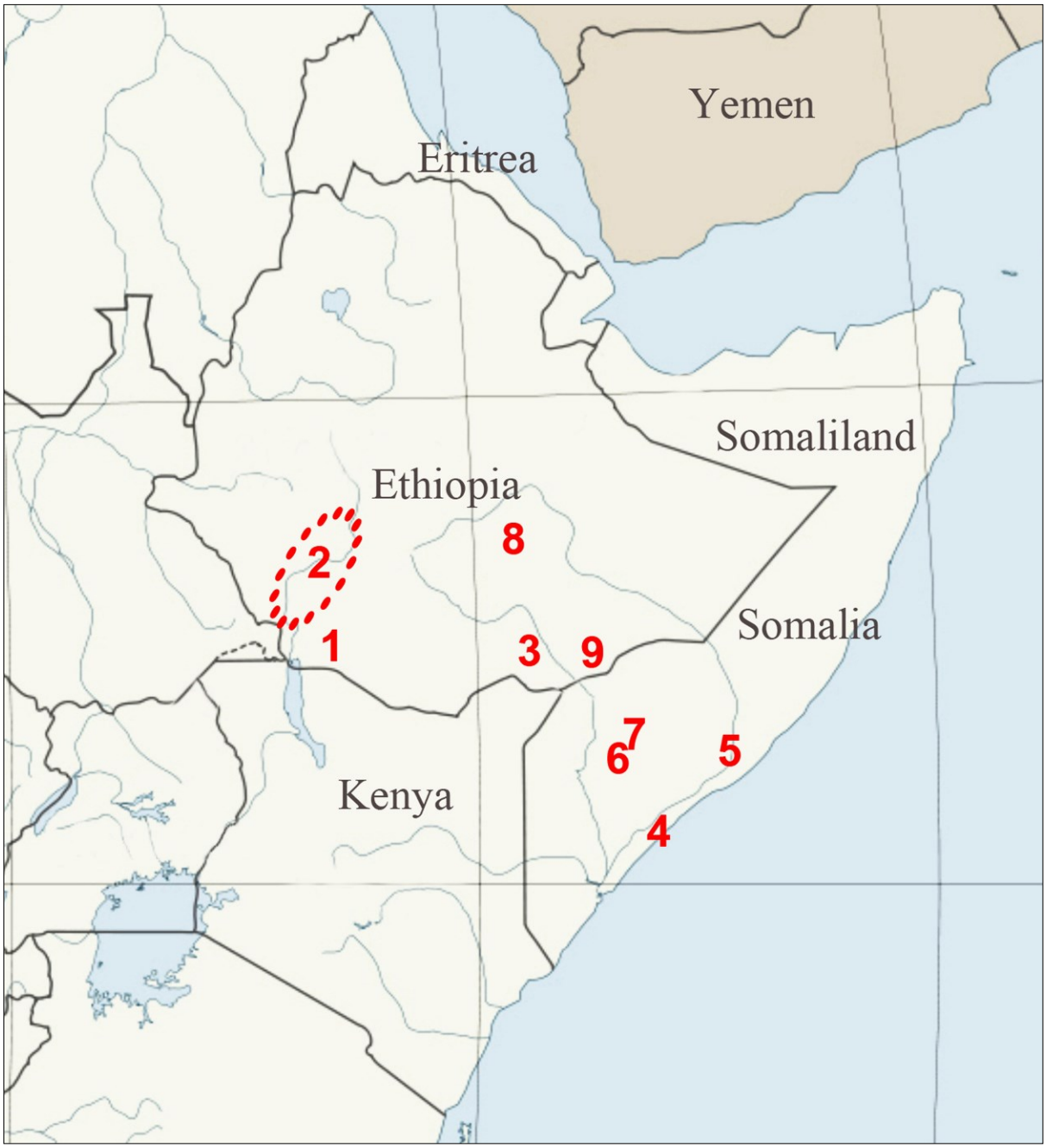


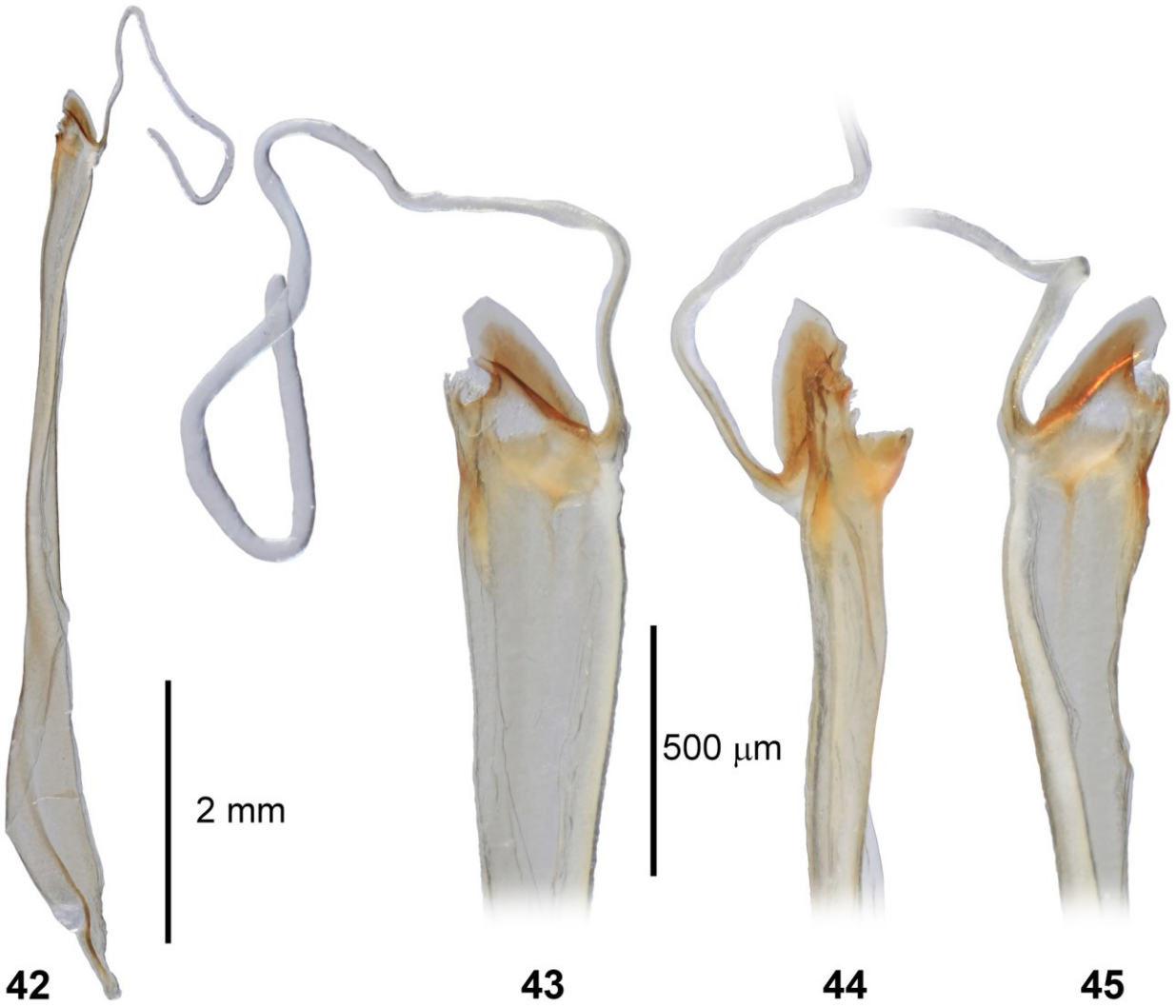
Figure 41: Map showing the distribution of *Uroplectes fischeri* in Ethiopia (1–3, 8–9) and Somalia (4–7). The specimens from localities 1–7 were examined by the first author (see "material examined" section); the localities 8–9 are cited by Kraepelin (1903: 566). **1**. El Dire, type locality of *Uroplectes fischeri caporiaccoi* Fet, 1997, replacement name for *Uroplectes fischeri intermedius* Caporiacco, 1941. **2**. Region of the Omo River valley, type locality of *Uroplectoides abyssinicus*. **3**. Somali State, Liben region, between Filtu and Dolo Odo, 04°50'07.5"N 40°55'13.5"E, 912 m a.s.l. (locality No. 14EI, Fig. 36). **4**. Barawa, type locality of *Uroplectes fischeri*. **5**. Villagio Duga degli Abruzzi. **6**. Bur Dinsor. **7**. Edain Caboba. **8**. Ginir (II.-III.1901, 1♂2♀, ZMUH). **9**. Ganale (III.1901, 1♂, ZMUH).

= *Uroplectoides abyssinicus* Lourenço, 1998: 313–315, figs. 1–6 (in part); Fet & Lowe, 2000: 277; Kovařík, 2003: 148. **Syn. n.**

Uroplectes vittatus (in part): FitzPatrick, 2001: 191–192.

TYPE LOCALITY AND TYPE DEPOSITORY. Somalia, Barawa, ZMHB No. 3010.

MATERIAL EXAMINED. **Ethiopia**, Missione Biologica Sagan-Omo, El Dire (04°59'N 37°07'E), 21.V.1939, 1♀ (holotype of *Uroplectes fischeri caporiaccoi* Fet, 1997, replacement name for *Uroplectes fischeri intermedius* Caporiacco, 1941), leg. E. Zavattari, MZUF No. 1153; region of the Omo river Valley, 1♀, III.1976 (holotype



Figures 42–45: Left hemispermatophore of *Uroplectes fischeri* from Ethiopia (locality 14EI). Views of entire hemispermatophore in dorsal aspect (42), and capsule region in dorsal (43), ental (44) and ventral (45) aspects (axes referenced to in situ position of hemispermatophore within animal).

of *Uroplectoides abyssinicus*) (Fig. 1), leg. J. Grand, ZMUH No. A55/98; Somali State, Liben region, between Filtu and Dolo Odo, 04°50'07.5"N 40°55' 13.5"E, 912 m a.s.l. (Fig. 36, locality No. 14EI), 1♀ (Figs. 5–6, 11–19, 24–26, 28, 30–35, 37–39), 1juv. (Figs. 7–8), 20.XI.2014, leg. F. Kovařík and P. Kučera, 2♂1♀ (Figs. 3–4, 9–10, 20–23, 27, 29, 40, offspring of the female from locality No. 14EI, bred by D. Hoferek), FKCP. **Somalia**, Barawa (01°11'N 44°02'E), 1♂1♀ (lectotype, Fig. 2, and paralectotype of *Uroplectes fischeri*), leg. Fischer, ZMHB No. 3010; Villagio Duga degli Abruzzi, 2♀, V.1928, MZUF No. 833; Bur Dinsor, 3.VI. 1978, 1juv., MZUF No. 831; Edain Caboba, 18.VI.1978, 1♀, MZUF No. 832.

DIAGNOSIS. Total length 37–50 mm. Chelicerae yellow, strongly reticulate. Pedipalp movable fingers with 11 principal rows of denticles and apical row of four to five denticles; every row (except last one) has one internal and two external granules. Metasomal segments II–V punctate with dorsal carinae indicated, other carinae absent. Carapace with dark triangular marking. Telson setose with distinct subaculear tubercle. Female with basal pectinal tooth wide, oval, but not markedly longer than other pectinal teeth (Fig. 31). Adult males with segments of pedipalp and metasoma narrower than in female; ratio metasomal segment I length to width 1.45–1.56 in male, 1.2–1.4 in females; ratio metasomal segment V length to width 2.03–2.35 in male, 1.5–1.8 in females; fingers of pedipalps straight in both sexes. Pectines with 15–20 teeth in both sexes.

HEMISPERMATOPHORE. (Figs. 42–45) Trunk long, narrow, basally broadened. Flagellum relatively short, with pars recta shorter than pars reflecta. Capsule region with several lobe structures: a median lobe at the base of the

Ecdyses Chronological Data for *Uroplectes fischeri* – Ethiopia, locality No. 14EI					
Ecdyses	**first**	**second**	**third**	**fourth**	**fifth**
Date*	18.II.2015	26.III.2015	25.V.2015	8.VII.2015	28.VIII.2015
Male* 1	7	43	103	147	198
Male 2	7	46	107	154	226
Female	7	51	112	165	283
Days (average)	7	46.6	107.3	155.3	235.6

Table 1: Ecdyses data for three juvenile siblings *Uroplectes fischeri.* Chronological data are presented in number of days. The males and the female were reared through fifth instars. * refers to male 1 only.

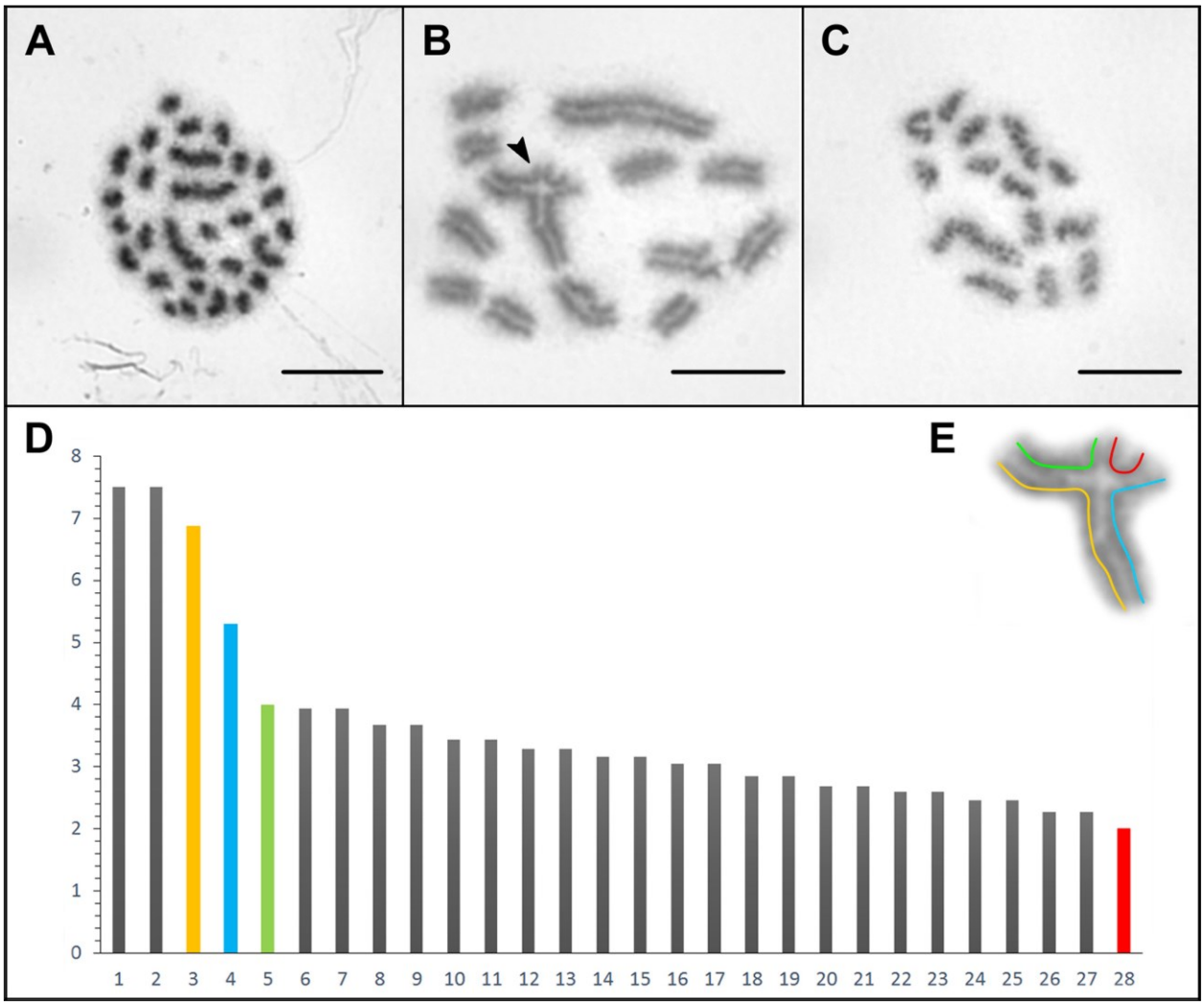


Figure 46: Chromosomes of male of *Uroplectes fischeri* from Ethiopia (locality 14EI). A) spermatogonial metaphase (2n=28); B) postpachytene, arrowhead shows tetravalent; C) one sister metaphase II (n=14); D) Idiogram based on postpachytene, y axis – % of the relative diploid set, colored chromosomes form tetravalent; E) tetravalent with colored single chromosomes. Bar=10µm.

flagellum, an ental lobe with incised, tufted or crown-like distal margin, and a prominent, dorsally projecting, hook-like basal lobe. These lobes are weakly sclerotized, indicating that the hemispermatophore may not be fully formed. The overall shape of the hemispermatophore and its lobes are consistent with that reported by Vachon (1950: 18, figs. 19–21) for *U. occidentalis* Simon, 1876, and by Lamoral (1979: 526,figs. 32–33) for *U. otjimbinguensis* (Karsch, 1879). These authors applied somewhat different terminologies. Vachon distinguished both an inner and median lobe, which seem to be part of the same structure that we collectively termed the median

lobe (= inner lobe of Lamoral). The tufted ental lobe corresponds to the external lobe of Vachon (= outer lobe of Lamoral). Our basal lobe corresponds to the same labeled structure of Vachon (= median lobe of Lamoral).

KARYOTYPE (Fig. 46). We analysed one male from Ethiopia (locality No.14EI) using standard cytogenetic methods (e. g. Kovařík et al., 2009). The chromosome complement of this specimen consists of 28 chromosomes (Fig. 46A). The chromosomes form two groups according to their size. The first four chromosomes are distinctly larger than all other chromosomes. They form 7.51 % to 5.30 % of the diploid set. The subsequent chromosomes gradually decrease in size from 4.00 % to 2.00 % of the diploid set (see Fig. 46D). Chromosomes exhibit typical holocentric organization without localised centromere region and possess achiasmatic behaviour during meiosis. These particular features are typical for the family Buthidae (e. g. Mattos et al., 2013). We further detected a distinct tetravalent in all observed post-pachytene nuclei (Fig. 46B). Despite the existence of this multivalent association, all analysed metaphases II exhibited the same number of chromosomes (n=14; Fig. 46C). The holocentric nature of chromosomes probably guarantees their equal split into sister metaphases II. In detail, observed multivalent is composed of four chromosomes possessing strikingly different size (Figs. 46D, 46E).

DISTRIBUTION. Ethiopia, ?Kenya, Somalia.

COMMENTS ON LOCALITY. The female and juvenile were collected under bark on the locality 14EI (Fig. 36) during daytime (temperature 34.6 ºC and 38% humidity). In addition to *Uroplectes fischeri*, the first author (FK) recorded *Babycurus subpunctatus* Borelli, 1925, *Hottentotta trilineatus* (Peters, 1861), *Parabuthus* cf. *liosoma* (Ehrenberg, 1828), and two very common species of *Pandinus* at this locality.

Acknowledgments

Thanks are due to David Hegner, Pavel Kučera, Tomáš Mazuch, Pavel Novák, Vít Socha, Vladimír Trailin, and David Vašíček (Czech Republic), Dereje Belay, Daneil Denbi, Aba Gragn, Zelalem Kebede, and Zelalem Mandefro (Ethiopia) who participated and helped in the expeditions to Ethiopia and Somaliland. The cytogenetic analysis was supported by grant received from Ministry of Education, Youth and Sports of the Czech Republic No. SVV 260208/2015. We thank Hieronymus Dastych (ZMUH), Jason Dunlop (ZMHB), and Sarah Whitman (MZUF) for their kind loans of type specimens. We are also indebted to Radomír Jirsák (Czech Republic) for Figures 37 and 38. Further, we thank two anonymous reviewers for their comments on the manuscript.

References

CAPORIACCO, L. DI. 1936. Scorpioni, Pedipalpi, Solifugi e Chernetidi di Somalia e Dancalia. *Annali del Museo Civico di Storia Naturale di Genova*, 58: 135–149.

CAPORIACCO, L. DI. 1941. Arachnida (Esc. Acarina). *Missione Biologica Sagan-Omo, Zoologia*, 6: 21–175.

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. & G. LOWE. 2000. Family Buthidae C. L. Koch, 1837. Pp. 54–286 *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.

FET, V. & W. D. SISSOM 1997. A new generic synonymy in scorpions: *Scorpiobuthus* Werner = *Uroplectes* Peters (Scorpiones, Buthidae). *The Journal of Arachnology,* 25: 408–409.

FITZPATRICK, M. J. 2001. Synonymy of some *Uroplectes* Peters, 1861 (Scorpiones: Buthidae). 191–193 *in*: Fet, V. & P. A. Selden (eds.), *Scorpions 2001: In Memoriam Gary A. Polis.* Burnham Beeches, Bucks: British Arachnological Society, 404 pp.

KARSCH, F. 1879a. Skorpionologische Beiträge I. and II. *Mittheilungen des Münchener Entomologischen Vereins,* 3: 6–22, 97–136.

KARSCH, F. 1879b. Westafrikanische Arachniden gesammelt von Herrn Stabsarzt Dr. Falkenstein. *Zeitschrift für die Gesammten Naturwissenschaften*, *Berlin* IV(3): 329–373.

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. 2011a. *Buthus awashensis* sp. n. from Ethiopia (Scorpiones, Buthidae). *Euscorpius*, 128: 1–6.

KOVAŘÍK, F. 2011b. 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. 2012. Review of the subgenus *Pandinurus* Fet, 1997 with descriptions of three new species (Scorpiones, Scorpionidae, *Pandinus*). *Euscorpius*, 141: 1–22.

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. 2015. Scorpions of Ethiopia (Arachnida, Scorpiones). Part I. Genus *Butheoloides* Hirst, 1925 (Buthidae) with description of a new species. *Euscorpius*, 195: 1−10.

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, J. PLÍŠKOVÁ & F. ŠŤÁHLAVSKÝ 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. ŠŤÁHLAVSKÝ. 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. & T. MAZUCH. 2011. *Hemiscorpius novaki* sp. n. from Somaliland (Scorpiones: Hemiscorpiidae). *Euscorpius*, 126: 1–9.

KOVAŘÍK, F. & T. MAZUCH. 2015. Scorpions of Ethiopia (Arachnida, Scorpiones). Part III. Genus *Hottentotta* Birula, 1908 (Buthidae), with description of three new species. *Euscorpius*, 202: 1−37.

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. 2009. *Tityus ythieri* Lourenço, 2007 is a synonym of *Tityus magnimanus* Pocock, 1897 (Scor-piones: Buthidae): a combined approach using morphology, hybridization experiments, chromosomes, and mitochondrial DNA. *Euscorpius*, 77: 1–12.

KOVAŘÍK, F. & S. WHITMAN. 2005. Cataloghi del Museo di Storia Naturale dell'Università di Firenze – sezione di zoologia «La Specola» XXII. Arachnida Scorpiones. Tipi. Addenda (1998–2004) e checklist della collezione (Euscorpiinae esclusi). *Atti della Società Toscana di Scienze Naturali*, *Memorie*, serie B, 111 (2004): 103–119.

KRAEPELIN, K. 1891. Revision der Skorpione. I. Die Familie des Androctonidae. *Jahrbuch der Hamburgischen Wissenschaftlichen Anstalten*, 8(1890): 144–286 (1–144).

KRAEPELIN, K. 1895. Nachtrag zu Theil I der Revision der Skorpione. *Jahrbuch der Hamburgischen Wissenschaftlichen Anstalten*, 12(1894): 73–96.

KRAEPELIN, K. 1899. Scorpiones und Pedipalpi. *In:* F. Dahl (ed.), *Das Tierreich. Herausgegeben von der Deutschen Zoologischen Gesellschaft.* Berlin: R. Friedländer und Sohn Verlag, 8. Lieferung, 265 pp.

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.

KRAEPELIN, K. 1908. Skorpione und Solifugen. *In:* L. Schultze (ed.), Zoologische und anthropologische Ergebnisse einer Forschungsreise im Westlichen und Zentralen Südafrika ausgeführt in den Jahren 1903-1905. Erstr band: Systematik und Tiergeographie. *Denkschriften den Medicinisch-naturwissenschaftliche Gesellschaft zu Jena*, 13: 247–282.

LAMORAL, B. H. 1979. The scorpions of Namibia (Arachnida: Scorpionida). *Annals of the Natal Museum*, 23(3): 498-783

LAMORAL, B. H. & S. REYNDERS. 1975. A catalogue of the scorpions described from the Ethiopian

Faunal Region up to December 1973. *Annals of the Natal Museum*, 22: 489–576.

LOURENÇO, W. R. 1998. *Uroplectoides abyssinicus* gen. n., sp. n., a new genus and new species of scorpion (Scorpiones, Buthidae) from Ethiopia. *Entomologische Mitteilungen aus dem Zoologischen Museum Hamburg*, 12(158): 309–316.

MATTOS, V. F., D. M. CELLA, L. S. CARVALHO, D. M. CANDIDO & M. C. SCHNEIDER. 2013. High chromosome variability and the presence of multivalent associations in buthid scorpions. *Chromosome Research*, 21: 121–136.

PETERS, W. 1861. Über eine neue Eintheilung der Skorpione und über die von ihm in Mossambique gesammelten Arten von Skorpionen. *Monatsberichte der Königlichen Preussischen Akademie der Wissenschaften zu Berlin*, 1861: 507–520.

POCOCK, R. I. 1896. A further revision of the species of scorpions belonging to the South-African genera *Uroplectes*, *Lepreus*, and *Tityolepreus*. *Annals and Magazine of Natural History*, 6(17): 377–393.

SIMON, E. 1882. Arachnides. *In* Fairmaire, L. & E. Simon. Récoltes entomologiques de M. A. Burds, sur le trajet de Zanzibar aux Grands Lacs. *Annales de la Sociéte Entomologique de Belgique*, 26: 58–60.

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.

THORELL, T. 1876. On the classification of scorpions. *Annals and Magazine of Natural History*, 4(17): 1–15.

VACHON, M. 1950. Subsidios para o estudo da biologia na Lunda. Remarques sur les scorpions de l'Angola (Première note). *Publicacões Culturais da Companhia de Diamantes Angola (Luanda)*, 1950: 5–18.

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.

WERNER, F. 1939. Ueber einige Scorpione aus dem Museum Alexander Koenig. *Festschrift zum 60. Geburtstage von Professor Dr. Embrik Strand*, 5(1938): 361–362.