

A review of the scorpions of East Africa with special regard to Kenya and Tanzania

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A Review of the Scorpions of East Africa with Special Regard to Kenya and Tanzania¹

PETER J. PROBST

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Abstract

The scorpion fauna of Kenya and Tanzania is composed of 25 different “forms” which are included in an illustrated key allowing their identification.

These “forms” belong to the 2 families Buthidae and Scorpionidae, and represent 11 genera and 23 species, one of the species with 3 subspecies.

A checklist gives some data on general external features and the geographical distribution of these scorpions.

A further list comprises the genera and species recorded from adjacent East African countries, but hitherto not known in Kenya or Tanzania.

1. Introduction

Although in recent years comprehensive keys for the identification of the scorpions of North Africa [20], West Africa [1], and South Africa [11] have been published, one looks in vain for a corresponding publication on the scorpion fauna of East Africa. To identify East African scorpions one has to go back to antiquated monographs [9, 24] and the numerous individual descriptions, many of which are hard to come by.

Moreover, with the only exception of *Buthotus* [23], the genera and species represented in East Africa have not been subject to recent revisions; above all studies of important new criteria in taxonomy, such as trichobothria and paraxial organs (hemispermatophores), are missing.

¹ This article is dedicated with gratitude to Professor Dr. Rudolf Geigy, Director of the Swiss Tropical Institute, Basle, on the occasion of his 70th anniversary.

It could not be the objective of the present preliminary study to undertake such investigations; its intention is to collect the widespread diagnoses of the literature and to present a key which should enable the non-specialist, too, to identify scorpions from East Africa with a certain reliability.

The key was prepared with particular regard to Kenya and Tanzania since the scorpion fauna of this region seems to have a certain compactness (due to the particularity of its geographical situation within the natural boundaries of the great rift-valley and the Indian Ocean); further, because I was able to gain some good knowledge of this fauna during my stay in Tanzania in 1966, by collecting scorpions by myself and from a study of the specimens in the Nairobi and Dar-es-Salaam museums. I further had at my disposal a small collection of scorpions from Tanzania, a result of the Swiss Tropical Institute's activity of many years in Ifakara (Rural Aid Centre).

The key and checklist are mainly based upon the works of KRAEPELIN [9, 10], WERNER [24], and VACHON [20], completed by my own observations and data from some other publications (all cited in the list of references, with further articles which may also be useful for the interested reader). In addition to the key and checklist for Kenya/Tanzania a list was prepared of the scorpion genera and species recorded from adjacent countries which, perhaps, might be found also in Tanzania or Kenya one day.

I wish to express my thanks to Prof. Dr. Rudolf Geigy and Prof. Dr. T. A. Freyvogel of the Swiss Tropical Institute, Basle, for their help in carrying out this study, and mainly for making my stay in East Africa possible.

2. Key for Identification of East African (Kenya and Tanzania) Scorpions

1. – Pincer of the pedipalp slender, hand rounded (oval), mostly smooth. Fingers at least as long as the hand [fig. 1]. Sternum narrows towards the front end, subtriangular [fig. 4a]. Pedal spurs are present on both the inside and outside of the legs [fig. 5a]. Often a subaculear tooth is present [fig. 6].
 ... (A) fam. *Buthidae* 2
- Hand large and flattened, with distinct upper and lower edges, mostly with distinct finger crest [fig. 3]. Fingers mostly shorter than the hand. Sternum broad, with nearly parallel sides, pentagonal [fig. 4b]. Pedal spurs only on the exterior side of the tarsus [fig. 5b]. No subaculear tooth.
 ... (B) fam. *Scorpionidae* 17

A. Fam. *Buthidae*

Subfamily: exclusively represented: *Buthinae*

2. – No tibial spurs [fig. 5], neither on 4th nor on 3rd leg.

Cauda of the male extremely elongated, measuring more than 1.5 times the length of the trunk.

... (7) *Isometrus maculatus* (p.325 and fig.13)

- Tibial spurs are present on 4th leg². Cauda in both sexes scarcely longer than the trunk.

... (6) *Babycurus* 3

- Distinctly formed tibial spurs on both the 3rd and 4th legs [fig. 5a]; rarely they may be very small 6

3. – Last ventral shield smooth, without keels. No ventral keels in the caudal segments; they might possibly be recognised as delicate lines in segments 1 and 2.

... (6d) *Babycurus centrurimorphus* (p.325)

- Last ventral shield with 2 or 4 distinct granular keels or ridges [fig. 2]. Ventral medial keels [fig. 2] distinctly granular at least in caudal segments 1 to 4 4

4. – Caudal surfaces smooth, or possibly with very fine granulations, and concave; segments 4 and 5 may be slightly convex in the male. Movable finger of the pincer with 7 to 8 oblique rows of granules, apart from the fused basal rows and the small row at the tip [fig. 9a]. Hand of the male markedly broader than the forearm 5

- Caudal surfaces with dense, large granulations, and convex at least from the 3rd segment on. Movable finger of the pincer with only 6 (very rarely 7) oblique rows (apart from the basal and terminal rows) [cf. fig. 9a]. In both sexes hand at most as broad as the forearm.

... (6c) *Babycurus jacksoni* (p.325)

5. – Movable finger with 8 oblique rows (apart from the basal and terminal rows; cf. fig. 9a). Posterior caudal segments darker, but not markedly broader than the anterior ones. Telson almost as broad as the 5th caudal segment at its posterior end. Trunk of one colour. Length of body up to 100 mm.

... (6a) *Babycurus gigas* (p.324)

- Movable finger of the pincer with only 7 rows (apart from the basal and terminal ones; fig. 9a). In the male posterior caudal segments markedly broader, but scarcely darker than the anterior ones. Telson distinctly narrower than the 5th caudal segment at its end. Trunk with 3 faint dark bands. Not more than 45 mm in length.

... (6b) *Babycurus wituensis* (p.324)

² Occasionally rudimentary on one side of the body (or even on both sides?) (*Babycurus centrurimorphus*); not to be confused with *I. maculatus*!

6. – A distinct, pointed and pigmented subaculear tooth or tubercle is present [fig. 6] 7
 - No subaculear tooth; or only a small, nonpigmented protuberance is present 13
7. – Fixed finger of the cheliceres ventrally without teeth [fig. 7b].
 - . . . (5) (*Uroplectes fischeri*) 8
 - Fixed finger of the cheliceres with 1 or 2 ventral teeth [fig. 7a] 10
8. – Trunk dorsally with a broad, undivided pale median band. Median keel [fig. 1] pale or possibly darkened in its posterior half only. Carapace at the sides of the dark, triangular area usually of clear colour, without dark bands . 9
 - Trunk entirely black dorsally; if a pale median band is present the median keel is black along the whole of its length. Carapace at both sides of the dark triangle with a continuous dark band.
 - . . . (5c) *Uroplectes fischeri*
var. *nigrocarinatus* (p. 324 and fig. 12)
9. – Dorsal furrow of the cauda smooth; the posterior ends of the 3rd and 4th (but never of the 5th) segment possibly faintly granular. Median keel of the trunk pale along the whole of its length. Cutting edge of the movable finger of the pincer with 11 oblique rows [fig. 9b]. In the female the most interior tooth of the pecten is enlarged.
 - . . . (5a) *Uroplectes fischeri*
typicus (p. 323)
 - Dorsal furrow of the cauda with fine granulations along the whole of its length, even in the terminal groove of the 5th segment. Median keel of the trunk with traces of a black line. 12 oblique rows on the cutting edge of the movable pedipalp finger. Female without enlarged tooth on the pecten.
 - . . . (5b) *Uroplectes fischeri*
ssp. *xanthogrammus* (p. 324)
10. – Number of pectinal teeth less than 19.
 - . . . (4) (*Lychas*) 11
 - More than 19 pectinal teeth.
 - . . . (3) *Odonturus dentatus* (p. 322)
11. – Basal row of granules on the movable finger of the pincer without external lateral granules [cf. fig. 9]. Last ventral shield without keels; the anterior caudal segments lack ventral medial keels [cf. fig. 2].
 - . . . (4a) *Lychas burdoi* (p. 322) and fig. 11)

- Basal row on the movable finger of the pincer with 2 distant, minute lateral granules at the exterior side of the cutting edge [fig. 9b]. Last ventral shield with 2 or 4 distinct keels [fig. 2]. Ventral medial keels are distinct even in the anterior caudal segments 12
- 12. – 4th ventral shield with dense, fine granulations along almost its whole length. In the 2nd and 3rd caudal segments the terminal tubercle of each dorsal keel is markedly enlarged and in a tooth-like oblique position. 17 to 19 pectinal teeth.
 . . . (4b) *Lychas obsti* (p. 322)
- 4th ventral shield without or with only few, faint granulations. Terminal tubercles of the dorsal keels scarcely bigger than the other ones, not tooth-like. 14 to 16 pectinal teeth in the female, 18 in the male.
 . . . (4c) *Lychas asper*
 var. *obscurus* (p. 323)
- 13. – Tergites with a single (median) crest, or even the median crest missing.
 . . . (2) (*Parabuthus*) 14
- Tergites with 3 crests, at least in the posterior part of the trunk.
 . . . (1) (*Buthotus*) 15
- 14. – Cauda coloured yellowish-red; not becoming markedly darker in the posterior half, never red-brown. Colour of the trunk light yellow, scarcely darker than the legs and pedipalps.
 . . . (2b) *Parabuthus pallidus* (p. 321)
- Caudal segments 1 to 3 yellow, segments 4, 5 and telson red-brown. Legs and pedipalps coloured much lighter than the trunk.
 . . . (2a) *Parabuthus liosoma* (p. 321)
- 15. – Superior lateral keel (i.e. 2nd keel from above) of 4th caudal segment weakly denticulate, consisting of more than 16 teeth. 5th caudal segment more than twice as long as wide. 5 dark areas on each tergite. On the cauda, legs, and pedipalps the insertions of hairs are surrounded by dark spots.
 . . . (1a) *Buthotus polystictus* (p. 320 and fig. 10)
- Superior lateral keel of 4th caudal segment markedly denticulate, consisting of less than 14 teeth. 5th caudal segment less than twice as long as wide. Trunk of one colour; insertions of hairs without black spots 16

16. – Superior lateral keel of the 5th caudal segment not very distinct. Superior lateral and dorsal keels of the 4th caudal segment fairly developed. Below the terminal tooth of the dorsal keel in caudal segment 4, the distance between superior and inferior lateral keels is divided into 2 equal parts by the median lateral keel. Pincer slender, length of the movable finger more than 1.4 times the length of the adjacent part of the hand.

... (1b) *Buthotus trilineatus* (p. 320)

- Superior lateral keel of the 5th caudal segment strong, consisting of large, tooth-like granules. Superior lateral and dorsal keels of 4th caudal segment markedly developed, forming the sharp edges of a deep trough-like concave dorsal furrow. Below the terminal tooth of the dorsal keel in caudal segment 4, the distance between superior and median lateral keels is longer than that between median and inferior lateral keels. Pincer very large, both fingers with strong lobes at their bases; movable finger less than 1.2 times as long as the hand.

... (1c) *Buthotus emini* (p. 321)

B. Fam. Scorpionidae

Subfamilies represented in East Africa:

- | | | |
|-------|---|----|
| | <i>Scorpioninae</i> and <i>Ischnurinae</i> | 17 |
| 17. – | End of tarsus with rounded terminal lobes [fig. 5b], their superior edges forming a sharp angle with the dorsal (median) claw lobe. Hand mostly with a large, rounded palm. | |
| | ... subfam. <i>Scorpioninae</i> | 18 |
| – | End of tarsus without rounded lobes, running downwards laterally in a straight line, forming a right angle with the dorsal claw lobe [fig. 5a]. Hand flattened, without or with only weakly developed palm, always with a distinct finger-crest. Fingers mostly markedly shorter than the hand. | |
| | ... subfam. <i>Ischnurinae</i> | 23 |

B1. Subfam. Scorpioninae

- | | | |
|-------|--|----|
| 18. – | Inferior side of the forearm plain, with a sharp but smooth inner margin; along this margin numerous trichobothria in 2 to 4 rows. | |
| | ... (9) (<i>Pandinus</i>) | 19 |

- Inferior side of the forearm plain or convex, its inner margin rounded, with only 3 distant trichobothria.
 ... (8) (*Opisthophthalmus*) 22
- 19. – Last ventral shield with 2 or 4 distinct, smooth ridges [fig. 2]. Inner margin of the hand completely smooth, without granules or tubercles 21
- Last ventral shield without distinct keels. Inner margin of the hand not forming a smooth line, but trimmed with tubercles 20
- 20. – Number of pectinal teeth 11 to 14.
 ... (9b) *Pandinus viatoris* (p. 327)
- Number of pectinal teeth 17 to 21.
 ... (9d) *Pandinus gregoryi* (p. 328 and fig. 14)
- 21. – Dorsal keels of the cauda smooth, non-granulated. Legs and telson light yellow. 19 to 20 pectinal teeth.
 ... (9c) *Pandinus bellicosus* (p. 327)
- Dorsal keels of the cauda formed by distinct oblique teeth. Legs and telson brown. In the male the surface of the hand presents a large, deep groove near the base of the fixed finger; in the female not as markedly developed, but also present. 13 to 15 pectinal teeth.
 ... (9a) *Pandinus cavimanus* (p. 327)
- 22. – Last ventral shield with 4 strong granular keels [fig. 2]. The same is true of the first caudal segment ventrally. Eyes in the centre of the carapace.
 ... (8a) *Opisthophthalmus boehmi* (p. 326)
- Last ventral shield and first caudal segment (ventrally) without granular keels; at the most traces of smooth ridges are present. Eyes situated considerably behind the centre of the carapace.
 ... (8b) *Opisthophthalmus glabrifrons* (p. 326)

B2. Subfam. Ischnurinae

- 23. – Underside of tarsus (tarsomere II) with strong, dark spines on either side: median line without denticles [fig. 8a].
 ... (10) *Opisthacanthus fischeri*
 (p. 328 and fig. 15)
- Underside of tarsus with a median row of minute thorn-like teeth; at the sides of this median row no spines, but only fine, long bristles³ [fig. 8b].
 ... (11) *Iomachus politus* (p. 328 and fig. 16)

³ In old adult specimens these are sometimes worn down, giving the impression of spines; but these "false spines" are never dark.

3. Review of the Genera and Species Included in the Key (Kenya and Tanzania)

3.1. Classification

The scorpion fauna of Tanzania/Kenya as known up to now includes 2 families; 3 subfamilies; 11 genera; 23 species, 1 of them with 3 different subspecies; thus representing a total number of 25 different “forms”:

A. Family Buthidae

a) Subfamily Buthinae

- | | |
|-----------------------------|--|
| 1. <i>Buthotus</i> Vachon | a) <i>polystictus</i> (Poc.) |
| | b) <i>trilineatus</i> (Ptrs.) |
| | c) <i>emini</i> (Poc.) |
| 2. <i>Parabuthus</i> Poc. | a) <i>liosoma</i> (H. & E.) |
| | b) <i>pallidus</i> (Poc.) |
| 3. <i>Odonturus</i> Karsch | <i>dentatus</i> Karsch |
| 4. <i>Lychas</i> C.L.K. | a) <i>burdoi</i> (Simon) |
| | b) <i>obsti</i> Kraep. |
| | c) <i>asper</i> (Poc.) <i>obscurus</i> Kraep. |
| 5. <i>Uroplectes</i> Ptrs. | a) <i>fischeri</i> (Karsch) (typicus) |
| | b) <i>fischeri</i> (Karsch) <i>xanthogrammus</i> (Poc.) |
| | c) <i>fischeri</i> (Karsch) <i>nigrocarinatus</i> Kraep. |
| 6. <i>Babycurus</i> Karsch | a) <i>gigas</i> Kraep. |
| | b) <i>wituensis</i> Kraep. |
| | c) <i>jacksoni</i> (Poc.) |
| | d) <i>centrurimorphus</i> Karsch |
| 7. <i>Isometrus</i> H. & E. | <i>maculatus</i> (De Geer) |

B. Family Scorpionidae

a) Subfamily Scorpioninae

- | | |
|-----------------------------------|--------------------------------|
| 8. <i>Opisthophthalmus</i> C.L.K. | a) <i>boehmi</i> (Kraep.) |
| | b) <i>glabrifrons</i> (Ptrs.) |
| 9. <i>Pandinus</i> Thor. | a) <i>cavimanus</i> (Poc.) |
| | b) <i>viatoris</i> (Poc.) |
| | c) <i>bellicosus</i> (L. Koch) |
| | d) <i>gregoryi</i> (Poc.) |

b) Subfamily *Ischnurinae*

10. *Opisthacanthus* Ptrs. *fischeri* Kraep.
 11. *Iomachus* Poc. *politus* Poc.

3.2. Checklist Indicating Main Characters
and Geographical DistributionA. Family *Buthidae*a) Subfamily *Buthinae*1. Genus *Buthotus* Vachon 19491a. *Buthotus polystictus* (Pocock 1896) [fig. 10]

Buthus polystictus, POCKOCK 1896: Ann. Mag. nat. Hist. (6) 17.
Buthotus polystictus (Poc.), VACHON & STOCKMANN 1968: Monit. zool.
 ital. (n.s.) 2 (suppl.): 99.

Coloration: yellow; trunk somewhat darker, with 5 dark areas on each tergite; keels with black granules; cauda, legs and pedipalps with dark spots round the insertions of bristles.

Structures: pincers long, slender; a small, colourless protuberance below the sting; pectinal teeth: ♂ 23–27, ♀ 18–20; body length 35 to 55 mm.

Distribution: *Ethiopia* (incl. Eritrea); *Somalia*; *Kenya*; *Tanzania* (loc.: Lake Manyara Park, coll. Probst 1966).

1b. *Buthotus trilineatus* (Peters 1861)

Centrurus trilineatus, PETERS 1861: Vortrag Einth. Skorp., Monogr. Ber. Ak. Berl.
Buthus trilineatus (Ptrs.), KRAEPELIN 1891: Jb. hamb. wiss. Anst. 8.
Buthotus trilineatus (Ptrs.), VACHON & STOCKMANN 1968: Monit. zool.
 ital. (n.s.) 2 (suppl.): 103.

Coloration: to some extent variable within the large area of distribution; varying from light yellow (southern regions) to dark brown (northern regions); usually five dark spots are recognisable on each tergite.

Structures: a small, non-coloured protuberance below the sting. Pectinal teeth: ♂ 23–27, ♀ 18–23; body length 55 to 70 mm.

Distribution: *Somalia*; *Ethiopia*; *Kenya* (loc.: Namanga), *Tanzania* (loc.: Singida, Kilimanjaro [23]); *Zeire* (= Congo-Kinshasa); *Mozambique*; *South Africa* (Transvaal).

1c. *Buthotus emini* (Pocock 1890)

Buthus eminii, POCKOCK 1890: Ann. Mag. nat. Hist. (6) 2.

Buthus trilineatus (Ptrs.) var. *emini* Poc., KRAEPELIN 1899: Tierr. 8.

= syn. *Buthus minax* L. Koch, KRAEPELIN 1913: Jb. hamb. wiss. Anst. 30; 169.

Buthus (Hottentotta) emini Poc., BIRULA 1914: Ann. Mus. zool. Petersb. 19, 123.

Buthotus emini (Poc.) VACHON & STOCKMANN 1968: Monit. zool. ital. (n.s.) 2 (suppl.), 107.

Coloration: yellow, keels underlined with brown or black.

Structures: Pincers very large, with short, strongly lobed fingers; cauda thick, with a deep dorsal furrow; tubercle below the sting faintly developed; pectinal teeth (♀) 22–28 (♂); body length 45–60 mm.

Distribution: *Tanzania* (loc.: Zanguebar [23]; in [10] numerous localities are reported throughout Tanzania, but identity with this species is not ensured); *Kenya* (loc.: Ndara Plain, Athi Plain; Rivers Thiba, Tsavo [4]).

2. Genus *Parabuthus* Pocock 1890 (syn. *Heterobuthus* Kraepelin 1891)

2a. *Parabuthus liosoma* (Hemprich & Ehrenberg 1828)

Androctonus liosoma, H. & E. 1828: Symb. phys. scorp. 2 (10).

Parabuthus liosoma (H. & E.), POCKOCK 1890: Proc. zool. soc. Lond.: 124.

Heterobuthus liosoma (H. & E.), KRAEPELIN 1891: Mitt. Mus. Hamb. 8: 68.

Coloration: Trunk yellow to yellowish-red; posterior part of the cauda and telson red-brown; pedipalps and legs yellow.

Structures: No subaculear tooth is present; pectinal teeth: (♀) 27–40 (♂); body length up to 120 mm.

Distribution: *Arabia*, *Egypt*, Red Sea (with several subspecies); *Tanzania* (ssp. *abyssinicus*?; loc.: Moshi, Ufiome, Meru [10]).

2b. *Parabuthus pallidus* Pocock 1890

Parabuthus pallidus, POCKOCK 1890: Proc. zool. Soc. Lond.: 124.

Coloration: similar to *P. liosoma*, but cauda coloured pale yellow-red; trunk and legs lighter yellow.

Structures: no subaculear tooth; pectinal teeth: (♀) 27–40 (♂); body length up to 100 mm.

Distribution: *Kenya* (loc.: Mombasa, Pokomonie, Wanga, Fudadoya, Kenya, River Uaso Nyiro [10]; *Tanzania* (loc.: Kilimanjaro).

3. Genus *Odonturus* Karsch 18793a. *Odonturus dentatus* Karsch 1879

Odonturus dentatus, KARSCH 1879: SB. natf. Fr. Berl., 119.

Rhoptrurus dentatus, KARSCH 1886: Berl. ent. Z., 30, 77.

Pseudobuthus dentatus (Karsch), POCKOCK 1893: Ann. Mag. nat. Hist. (6) 12: 312.

Odonturus dentatus Karsch, KRAEPELIN 1899: Tierr. 8, 33.

Coloration: yellowish-brown; carapace somewhat lighter; often traces of a black median band on the trunk; cauda, pedipalps and legs yellow.

Structures: a strong subaculear tooth is present; the most interior pectinal tooth of ♀ very large; pectinal teeth: (♀) 21–27 (♂); body length to 70 mm.

Distribution: *Kenya* (loc.: Kibwesi, Pokomonie, Taita, Tana, Mombasa); *Tanzania* (loc.: Masai-Steppe, Tanga, Morogoro [10]).

4. Genus *Lychas* C.L. Koch 1843 (syn. *Archisometrus* Kraepelin 1891)4a. *Lychas burdoi* (Simon 1882) [fig. 11]

Isometrus burdoi, SIMON 1882: Bull. Soc. ent. belg., 26, LVIII.

Archisometrus burdoi (Sim.), KRAEPELIN 1891: Mitt. Mus. Hamb., 8, 80.

Lychas burdoi (Sim.), POCKOCK 1899: Proc. zool. Soc. Lond., 834.

Coloration: yellow to reddish-yellow, overall densely black-spotted; caudal segment 5, and telson red-brown, forearm and fingers black, hand pale, ventral side of trunk light yellow, 5th ventral shield with 2 black spots.

Structures: strong, pointed subaculear tooth; tibial spurs very small; pectinal teeth: 14–17; body length to 36 mm.

Distribution: *Tanzania* (loc.: Masai-Steppe, Usambara, Bagamoyo, Dar-es-Salaam, Kilwa, Lindi, Mikindani, Morogoro, Gologolo, Mpapua, Korogwe, Kilimatinde, Tanga, River Myere, Lake Tanganyika, Lake Malawi [10]; new loc.: Ifakara [leg. Prof. Geigy 1949, Probst 1966, Vogel 1970: habitats below bark, in Banana trunks]; Malinyi [leg. Ernst 1959]; Kisawasawa [leg. Vogel 1970]; Mafingi [leg. Vogel 1970]). *Zambia*; *Malawi*.

4b. *Lychas obsti* Kraepelin 1913

Lychas obsti, KRAEPELIN 1913: Jb. hamb. wiss. Anst. 30, 175.

Coloration: yellow-black-mottled; trunk with 5 black bands; cauda black-spotted, posterior parts of the segments darker, mainly in seg-

ment 5 and telson; ventral side of trunk yellow, 4th shield with 2 black spots at its posterior margin, 5th shield with traces of 2 longitudinal bands; arm mottled, forearm and hand dark, fingers yellow; legs spotted.

Structures: cauda of ♂ relatively elongated; tibial spurs small; a strong subaculear tooth; pectinal teeth: 17–20; body length up to 40 mm (♂).

Distribution: Southern parts of *Somalia*; *Kenya* (loc.: Tsavo: Maji, Madzura [4]; *Tanzania* (loc.: Kilimatinde, Tanga [10]).

- 4c. *Lychas asper* (Pocock) var. (ssp.?) *obscurus* Kraepelin 1913 (variety or subspecies of *L. asper* (Poc.) which is domestic in West Africa; is perhaps an autonomous species).

Lychas asper (Poc.) var. *obscurus*, KRAEPELIN 1913: Jb. hamb. wiss. Anst. 30, 175.

Coloration: yellow-black-mottled; posterior part of cauda, and telson red-brown; hand and forearm nearly black; ventral side of the trunk yellow with black spots.

Structures: tibial spurs small; a strong subaculear tooth; pectinal teeth: 14–16 (♀), 18 (♂); body length up to 36 mm.

Distribution (of variety): *Tanzania* (loc.: Mkalama, Kawende [Lake Tanganyika]); *Zambia*.

5. Genus *Uroplectes* Peters 1861

- 5a. *Uroplectes fischeri* (Karsch 1879) typicus

Lepreus fischeri, KARSCH 1879; Mitt. Münch. ent. Ver., 3, 124.

Uroplectes fischeri (Karsch), POCKOCK 1896; Ann. Mag. nat. Hist. (6), 17, 387.

syn. *Uroplectes f.* var. *flavimanus* Poc. 1890, KRAEPELIN 1913: Jb. hamb. wiss. Anst. 30, 177.

syn. *Uroplectes f.* var. *nigrimanus* Poc. 1890, KRAEPELIN 1913: Jb. hamb. wiss. Anst. 30, 177.

syn. *Uroplectes intermedius* Tullgren 1905, KRAEPELIN 1913: Jb. hamb. wiss. Anst. 30, 177.

Coloration: yellow; carapace with dark triangular area and dark side bands; trunk with 2 broad side bands; cauda yellow, in its posterior part darker, underside with black keel-lines.

Structures: ventral caudal surfaces with dispersed, large pits; subaculear tooth strong, right-angled; pectinal teeth: 18–19, the most interior tooth of ♀ is enlarged; body length 40–50 mm.

Distribution: *Ethiopia*; *Somalia*; *Kenya* (loc.: Kibwesi, Taita, Mombasa [10]; Uaso-Nyiro-River [13]; River Thiba [3]); *Tanzania* (loc.: Masai-Steppe; Morogoro, Mikindani, Mulenda [E-Usara], Meru [10]).

5b. *Uroplectes fischeri* (Karsch) ssp. *xanthogrammus*
Pocock 1897

Uroplectes xanthogrammus, POCKOCK 1897: Ann. Mag. nat. Hist. (6), 19, 118.

Uroplectes fischeri xanthogrammus Poc., KRAEPELIN 1913: Jb. hamb. wiss. Anst. 30, 179.

(represents perhaps an autonomous species).

Coloration and structures: similar with *U. fischeri* typicus, but ♀ without enlarged pectinal tooth.

Distribution: *Tanzania* (loc.: Lake Malawi [10]).

5c. *Uroplectes fischeri* (Karsch) var. *nigrocarinatus*
Kraepelin 1913 [fig. 12]

Uroplectes f. var. *nigrocarinatus*, KRAEPELIN 1913: Jb. hamb. wiss. Anst., 30, 179.

(by printer's error "nigrimanus").

Coloration: similar with typical form, but trunk all black or with pale median band which is divided by the black keel-line; carapace with dark triangle and 2 dark side bands.

Structures: pectinal teeth 18–20; body length up to 50 mm.

Distribution: throughout *Tanzania* (loc.: Masai-Steppe, Mkalama, Ufiome, Iramba, Irangi, Kilimatinde, Mpapua, Morogoro, Dar-es-Salaam, Kawende [Lake Tanganyika], Lake Malawi [10]; new loc.: Ifakara and surroundings [coll. Probst 1966; specimens show some variation from original description as to coloration and structural features]). Also *Madagascar* (?) [10].

6. Genus *Babycurus* Karsch 1886

6a. *Babycurus gigas* Kraepelin 1896

Babycurus gigas, KRAEPELIN 1896: Mitt. Mus. Hamb. 13, 124.

Coloration: trunk yellow-brown; cauda yellow-red, darker at its end; arm light yellow; forearm and hand yellow-red; fingers dark.

Structures: large, pointed subaculear tooth; cauda not becoming larger posteriorly; pectinal teeth: 21–24; body length up to 100 mm.

Distribution: *Tanzania* (loc.: mainly in the northern coast region: Usambara, Amani, Nguelo, Lewa, Tanga, Dar-es-Salaam, Morogoro, Nguru [10]).

6b. *Babycurus wituensis* Kraepelin 1913

Babycurus wituensis, KRAEPELIN 1913: Jb. hamb. wiss. Anst. 30, 181.

Coloration: trunk, cauda, appendages muddy yellow; trunk with 3 faint dark bands; fingers dark.

Structures: a large, pointed subaculear tooth; cauda of ♂ markedly enlarged posteriorly; pectinal teeth 20–21; body length up to 45 mm.

Distribution: *Kenya* (loc.: Pokomonie, Wanga [10]).

6c. *Babycurus jacksoni* (Pocock 1890)

Rhoptrurus jacksoni, Pocock 1890: Proc. zool. Soc. Lond. 13, 138.

Babycurus jacksoni (Poc.), KRAEPELIN 1891: Jb. hamb. wiss. Anst. 8, 96–98.

Coloration: trunk dark muddy yellow, with dark side bands; cauda, pedipalps, and legs yellow; fingers black.

Structures: cauda not enlarged in its posterior part; a pointed subaculear tooth; pectinal teeth: 20–24; body length up to 75 mm.

Distribution: *Tanzania* (loc.: Usambara [Amani, Nguelo], Mkata, Morogoro, Gologolo, Dar-es-Salaam, Lindi [10]).

6d. *Babycurus centrurimorphus* Karsch 1886

Babycurus centrurimorphus, KARSCH 1886: Berl. ent. Z. 30, 78.

= syn. *Babycurus pictus* Poc. 1896, KRAEPELIN 1899: Tierr. 8, 69.

Coloration: trunk yellow with 3 black bands; cauda light yellow, its ventral side with black spots; pedipalps yellow, fingers black.

Structures: tibial spurs of leg IV often rudimentary at one side of the body; caudal segment 4 to some extent enlarged; pectinal teeth 18–19; body length 40–55 mm.

Distribution: *Kenya* (loc.: Mombasa, Eldame River [10]; Mt. Kenya, Athi Plain, River Thiba [4]); *Tanzania* (loc.: Ukamba, Lake Victoria [Ukerewe], Kawende, Lake Tanganyika [Niomkolo] [10]); *Madagascar*; *Angola* (probably by artificial importation?).

7. Genus *Isometrus* Hemprich & Ehrenberg 1828

7a. *Isometrus maculatus* (De Geer 1778) [fig. 13]

(? *Scorpio europaeus*, LINNÉ 1758: Syst. nat. 10, 625).

Isometrus europaeus, LOENBERG 1897: Ann. Mag. nat. Hist. (7) 1, 86.

Scorpio maculatus, DE GEER 1778: Mém. Hist. Ins. 7, 346.

Lychas maculatus, C. L. KOCH 1845: Arachn. 12, 1, fig. 960.

Isometrus maculatus (De Geer), THORELL 1876: Ann. Mag. nat. Hist. (4), 17, 8.

[with numerous synonyms, such as: *Sc. dentatus* Karsch, *Sc. americanus* Karsch, *Lychas americanus* C.L.K., *Centrurus* (Isom.) *americanus* Ptrs., *Buthus* (Isom.) *filum* H. & E., *Atreus filum* Gerv., *Lychas paraensis* C.L.K., *Scorpio* (*Lychas*) *gabonensis* Lucas, *Sc. guineensis* Lucas].

Coloration: yellow or yellowish white, black mottled and spotted; trunk with 5 interrupted bands of dark spots, the side bands nearly continuous; each caudal segment dark in its posterior half.

Structures: ♂ with extremely elongated cauda (often more than twice as long as the trunk) and very slender pincers [fig. 13]. A strong, pointed (pentagonal) subaculear tooth; pectinal teeth: 15–20; body length: ♂ up to 75 mm, ♀ 45–50 mm.

Distribution: known from all continents and islands of the warm region (“tropicopolitic”). This wide-spread distribution is due to artificial transportation by man.

East Africa: mainly in the coast region; in inland regions only in close neighbourhood of human settlements [16]. Common.

Kenya; Zanzibar; Tanzania (from Tanga to Mikindani, Lake Tanganyika [10]; own loc.: Ifakara [very common; habitats: banana trunks, heaps of stones or wood, in houses and huts, rarely under bark], Mahenge, Mselezi, Dar-es-Salaam [Coll. Probst 1966]).

B. Family Scorpionidae

a) Subfamily Scorpioninae

8. Genus *Opisthophthalmus* C.L. Koch 1838

8a. *Opisthophthalmus boehmi* (Kraepelin 1896)

Heterometrus boehmi, KRAEPELIN 1896: Mitt. Mus. Hamb. 13, 131.

Scorpio boehmi, KRAEPELIN 1899: Tierf. 8, 125.

Opisthophthalmus boehmi, KRAEPELIN 1913: Jb. hamb. wiss. Anst. 30, 186.

Remarks: The position of this species remains doubtful, a fact which is easily recognised by the repeated reclassification by KRAEPELIN himself. Neither BIRULA (1910, Horae Soc. ent. Ross.) nor VACHON (1950, Arch. Inst. Pasteur Alg. 28, 160) has come to a final conclusion. Here the species is left without discussion within the genus *Opisthophthalmus* where KRAEPELIN finally placed it.

Coloration: varying from yellow, or yellow-red to a dark olive-brown.

Structures: pectinal teeth: 12–13 (♀), 19–20 (♂); body length 60 to 70 mm.

Distribution: Tanzania (loc.: Lake Tanganyika, Mpapua, Usagara [10]).

(Only few specimens known.)

8b. *Opisthophthalmus glabrifrons* Peters 1861

Opisthophthalmus glabrifrons, PETERS 1861: Mon. Ber. Akad. Berl., 514.

= syn. *O. laeviceps* Thorell 1877, KRAEPELIN 1894: Jb. hamb. wiss. Anst. 11, 104.

Coloration: trunk yellow-red to rusty-brown; telson, legs, pedipalps and anterior part of the carapace yellow-brown; palm red-brown, fingers black.

Structures: Eyes markedly behind the centre of the carapace; pectinal teeth: 10–11 (♀), 13–19 (–23) (♂); body length about 100 mm.

Distribution: *South Africa* (Natal, Transvaal); *Zambia*; *Malawi*; *Tanzania* (loc.: Mtira (on the river Ruvuma), Kilwa [10]).

9. Genus *Pandinus* Thorell 1877 (emend. Kraepelin)

9a. *Pandinus cavimanus* (Pocock 1888)

Scorpio cavimanus, POCKOCK 1888: Ann. Mag. nat. Hist. (6) 2.

Pandinus cavimanus (Poc.), KRAEPELIN 1899: Tierr. 8, 121.

Coloration: trunk and cauda (incl. telson) dark brown-red; palm somewhat paler.

Structures: hand very large, in the male with a large, deep groove near the base of the fixed finger; pectinal teeth: 12–15, body length about 100 mm.

Distribution: *West Africa* (Fernando Poo, Congo-Brazzaville [1]). *Tanzania* (inland regions only: loc.: Mpapua, Usagara, Kilimanjaro, Tabora, Uniamwesi, Bukoba [Lake Victoria], Lake Tanganyika [10]).

9b. *Pandinus viatoris* (Pocock 1890)

Scorpio viatoris, POCKOCK 1890: Ann. Mag. nat. Hist. (6) 6, 100.

Scorpio africanus ssp. *viatoris* Poc., KRAEPELIN 1894: Mitt. Mus. Hamb. 11, 69.

Pandinus viatoris (Poc.), KRAEPELIN 1899: Tierr. 8, 122.

Coloration: trunk and cauda dark olive-green or dark brown; telson yellow-red; legs and palm brown.

Structures: pectinal teeth 11–14; body length up to 105 mm.

Distribution: *Tanzania* (inland only; loc.: Mpapua, Kilimatinde, Kwa Mtoro, Mkalama, Tabora, Kawende, Ufipa, Kasonso, Karongo, Useguha, Usambara [10]); *Sudan* (Southern parts); *Mozambique*.

9c. *Pandinus bellicosus* (L. Koch 1875)

Scorpio bellicosus, L. KOCH 1875: Aegypt. Abess. Arachn., 1.

Scorpio africanus ssp. *bellicosus*, L. Koch, KRAEPELIN 1894: Mitt. Mus. Hamb. 11, 69.

Pandinus bellicosus (L. Koch), KRAEPELIN 1899: Tierr. 8, 121.

Coloration: red-brown; telson and legs light yellow; palm yellowish-red.

Structures: hand large; pectinal teeth: 19–20; body length about 100 mm.

Distribution: *Eritrea*; *Ethiopia*; *Kenya*.

9d. *Pandinus gregoryi* (Pocock 1896) [fig. 14]

Scorpio gregorii (corr. *gregoryi*), Pocock 1896: Ann. Mag. nat. Hist. (6), 17, 432.

Pandinus pallidus (Kraep.) var. *gregoryi* Poc., Kraepelin 1899: Tierr. 8, 120.

Pandinus gregoryi (Poc.), Birula 1914: Ann. Mus. zool. Petersb. 14, 115.

Pandinus gregoryi (Poc.), Kraepelin 1913: Jb. hamb. wiss. Anst. 30, 183.

Coloration: trunk, cauda and head muddy green-brown to red-brown; legs yellow-brown.

Structures: pectinal teeth: 17–21; body length up to 75 mm.

Distribution: *Ethiopia*; *Somalia*; *Kenya* (loc.: Pokomonie, Taita, Tana, Wanga [10]; Simba, River Tsavo [4]).

b) Subfamily *Ischnurinae*10. Genus *Opisthacanthus* Peters 1861 [fig. 15]10a. *Opisthacanthus fischeri* Kraepelin 1911

Opisthacanthus fischeri, Kraepelin 1911: Mitt. Mus. Hamb. 28, 74, 79.
(Previously considered as variety of *O. asper* Peters 1861.)

Coloration: dark brown to black; legs and telson somewhat paler.

Structures: pectinal teeth: 8–10; body length up to 105 mm.

Distribution: *Tanzania* (loc.: Kilimanjaro, River Ruwu, Nguruman, Masai-Steppe [10]).

11. Genus *Iomachus* Pocock 189311a. *Iomachus politus* Pocock 1896 [fig. 16]

Iomachus politus, Pocock 1896: Ann. Mag. nat. Hist. (6) 17, 317.

Coloration: trunk and cauda dark brown to black; telson and pedipalps often somewhat paler with mottled or reticulate drawings; ventral side light red-brown.

Structures: forearm and pincer of the male markedly elongated [fig. 16]; genital opercula of the female grown together on the middle line; pectinal teeth 7–9; body length: ♀ up to 65 mm; ♂ up to 50 mm.

Distribution: *Kenya* (loc.: e.g. Mombasa; very common [10]; River Tsavo, Simba [4]); *Tanzania* (loc.: Tanga, Bagamoyo, Dar-es-Salaam, Kilwa, Lindi, Mikindani, Livale, Barikiwa, Lake Malawi [10]; new loc.: Ifakara, Mahenge [coll. Probst 1966; below bark], Selous Game Sanctuary [coll. Vogel 1971]).

**4. Synopsis of further Genera and Species
Reported for Adjacent East African Countries, but up to now
not Known in Kenya or Tanzania**

Only the names are indicated; descriptions and tables for determination may be consulted elsewhere in the literature [mainly 9, 11, 20, 23, 24].

a) Northern region

Buthidae:

<i>Buthotus scaber</i> (H. & E. 1928)	Ethiopia, Egypt
<i>Buthotus fuscitruncus</i> (Capor. 1936)	Ethiopia, Somalia
<i>Buthotus minax</i> (C. L. K. 1875)	
– <i>typicus</i>	Sudan, Eritrea; Egypt(?)
– <i>ssp. niloticus</i> (Bir. 1927)	Sudan
– <i>spp. tigrinus</i> (Capor. 1937)	Ethiopia, Eritrea
<i>Buthotus socotrensis</i> (Poc. 1903)	Island of Socotra
? <i>Buthus insolitus</i> Borelli	Somalia
<i>Buthacus granosus</i> Borelli 1929	Sudan
<i>Buthacus claviceps</i> Poc. 1900	Somalia
<i>Buthacus frontalis</i> Werner 1936	Eritrea
<i>Androctonus amoreuxi</i> (Sav. & Aud. 1812)	Sudan, Egypt
<i>Leiurus quinquestriatus</i> (H. & E.)	Sudan, Egypt
<i>Compsobuthus acutecarinatus</i> (Sim. 1882)	
– <i>ssp. abyssinicus</i> (Bir.)	Sudan, Ethiopia
<i>Orthochirus aristidis</i> Sim. 1908	Egypt, Somalia
<i>Parabuthus granimanus</i> Poc. 1895	Somalia, Aden
<i>Nanobuthus andersoni</i> Poc. 1895	Sudan
<i>Neobuthus berberensis</i> Hirst 1911	Somalia
<i>Microbuthus litoralis</i> (Pavesi 1883)	Ethiopia, Somalia
<i>Babycurus zambonellii</i> Borelli	Eritrea

Scorpionidae:

<i>Pandinus pallidus</i> (Kraep. 1894)	Somalia, Sudan
<i>Pandinus phillipsi</i> (Poc. 1896)	Somalia
? <i>Pandinus meidensis</i> Karsch 1879	Somalia (Meid; 1 specimen)
? <i>Pandinus exitialis</i> (Poc. 1888)	Ethiopia (Scioa; 1 specimen)
? <i>Pandinus colei</i> (Poc. 1896)	Somalia (1 specimen)
<i>Hemiscorpion socotranus</i> (Poc. 1903)	Island of Socotra

b) Southern region

Buthidae:

<i>Parabuthus granulatus</i> (H. & E. 1828)	Tanga [17], Mombasa (doubtful; = <i>P. pallidus</i> ?); apart from this only in South Africa
<i>Uroplectes flavoviridis</i> Ptrs. 1862	Lake Malawi, Zambia
<i>Uroplectes ornatus</i> Ptrs. 1862	Lake Malawi, Zambia

Scorpionidae:

<i>Opisthacanthus asper</i> (Ptrs. 1861)	Mozambique (Delagoa Bay)
<i>Opisthacanthus rugulosus</i> Poc. 1896	Malawi; South Africa (Transvaal)
<i>Ischnurus ochropus</i> C. L. K. 1838	Islands of Zanzibar, Seychelles, Mauritius

c) Madagascar

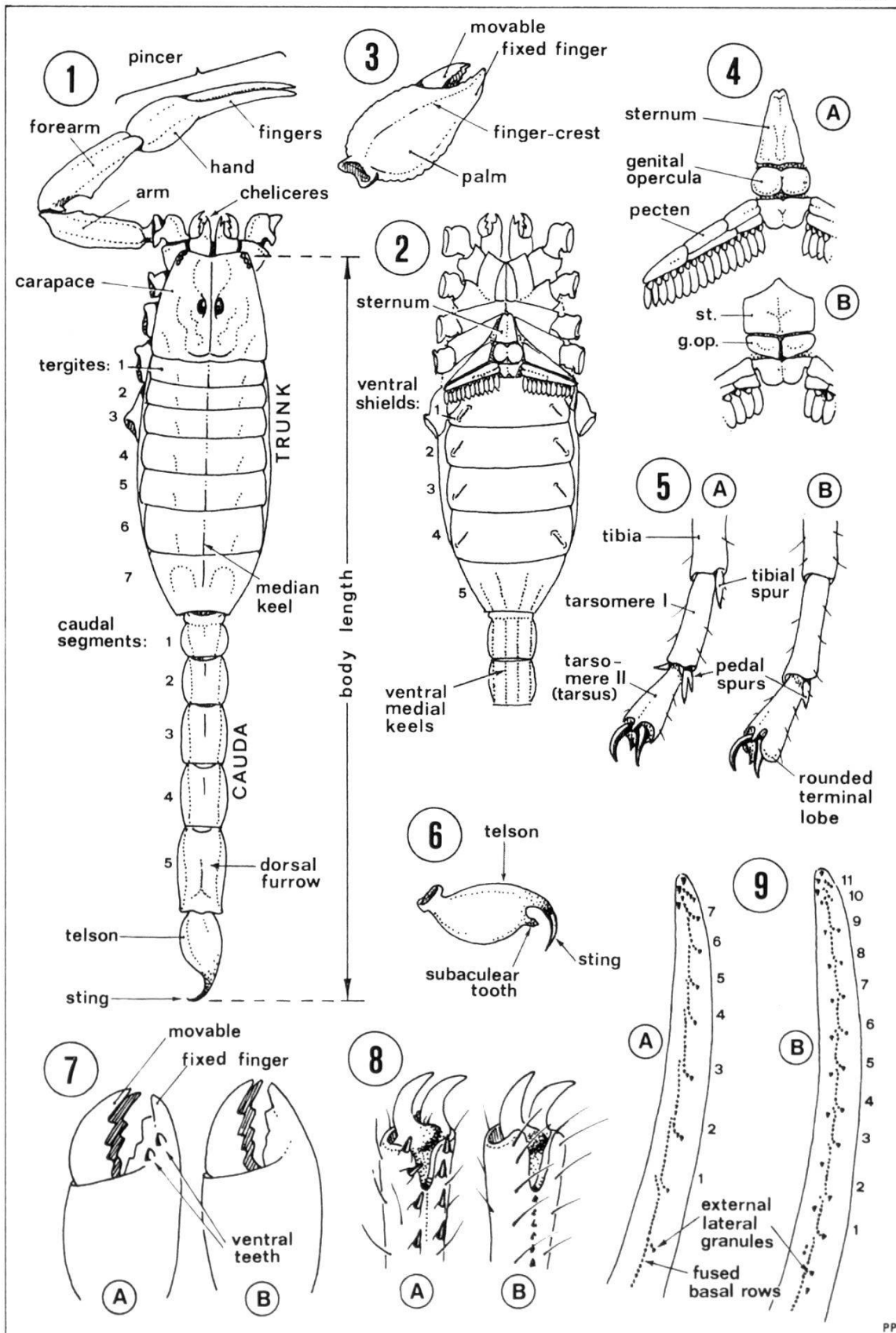
Buthidae:

Grosphus Sim. 1880 (8 species and subspecies; key in [21]).
Odonturus baroni (Poc. 1890)
Isometrus madagassus Roewer 1943

Scorpionidae:

Opisthacanthus madagascariensis Kraep. 1894
Opisthacanthus punctulatus Poc. 1896
Heteroscorpion Bir. 1903 (2 species; see [2]).
 The genera *Grosphus* Sim. and *Heteroscorpion* Bir. both occur exclusively on Madagascar.

PLATE I



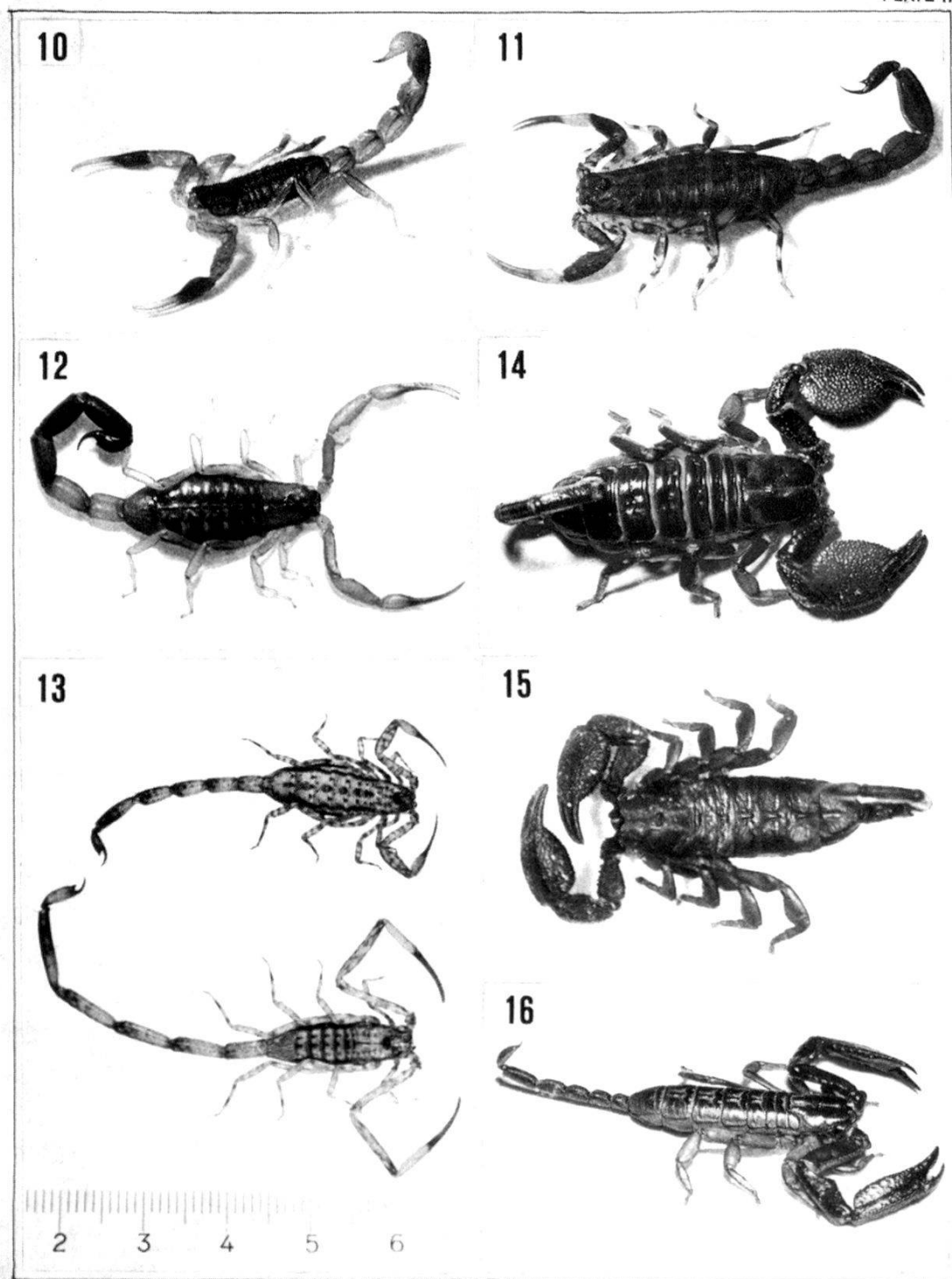


Plate I

- Fig. 1. Representative of the family Buthidae, dorsal view; legs and right pedipalp are left out.
 Fig. 2. The same, ventral view; legs, pedipalps, and cauda from 3rd segment on are left out.
 Fig. 3. Left pincer of a representative of the family Scorpionidae, dorsal view.
 Fig. 4. Genital area (A) of a Buthid, (B) of a Scorpionid.
 Fig. 5. Distal part of right 4th leg (A) of a Buthid, (B) of a Scorpionid.
 Fig. 6. Telson of a Buthid, lateral view.
 Fig. 7. Right cheliceres of two different Buthids, ventral view.
 Fig. 8. Underside of the tarsus (tarsomere II) of two different Scorpionids, (A) *Opisthacanthus*, (B) *Iomachus*.
 Fig. 9. Cutting edge of the movable pedipalp finger of two different Buthids, (A) *Babycurus*, (B) *Uroplectes*.

Plate II

- Fig. 10. *Buthotus polystictus* (Poc.) – ♂ juv., Lake Manyara Park, Tanzania, coll. Probst X. 1966 (from living specimen).
 Fig. 11. *Lychas burdoi* (Sim.) – ♀ ad., Ifakara (Ulanga-Distr.), Tanzania, coll. Probst VIII. 1966 (from living specimen).
 Fig. 12. *Uroplectes fischeri nigrocarinatus* Kraep. – ♀ ad., Ifakara, Tanzania, coll. Probst VIII. 1966 (from living specimen).
 Fig. 13. *Isometrus maculatus* (De Geer) – ♂ + ♀ ad., Ifakara, coll. Probst 1966 (alcohol-fixed specimens). The mm-scale belongs only to this figure.
 Fig. 14. *Pandinus gregoryi* (Poc.) – ♀ ad., from "East Africa", probably Kenya (living specimen, was maintained in captivity 1965–1968).
 Fig. 15. *Opisthacanthus fischeri* Kraep. (?) – ♀, origin uncertain. (Dried specimen for demonstration, Swiss Tropical Institute.)
 Fig. 16. *Iomachus politus* Poc. – ♂ ad., Mahenge (Ulanga-Distr.), Tanzania, coll. Probst VIII, 1966 (from living specimen).

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Zusammenfassung

25 verschiedene «Formen» von Skorpionen sind bisher zur Fauna von Kenia und Tansania gezählt worden. Deren Beschreibungen und Fundortsangaben sind in der Literatur weitherum verstreut und zum Teil nur schwer zugänglich. Daher wurde hier versucht, alle diese Daten in einem Bestimmungsschlüssel zusammenzustellen, der es dank beigelegter Illustrationen auch dem Nichtspezialisten ermöglichen sollte, Skorpione aus Ostafrika mit einer gewissen Sicherheit zu identifizieren.

Diese 25 «Formen» gehören zu den Familien Buthidae und Scorpionidae. Sie repräsentieren 11 verschiedene Gattungen und 23 Arten, wovon eine mit 3 Unterarten. In einer «Checklist» sind kurze Angaben über die wichtigsten Merkmale (wie Färbung, äußere Morphologie, Größe) und geographische Verbreitung dieser Skorpione zusammengestellt.

Weitere Gattungen und Arten, die in Ostafrika von den angrenzenden Ländern bekannt sind, jedoch bisher in Kenia und Tansania nicht nachgewiesen wurden, sind in einer zusätzlichen Liste aufgeführt. Mit ihrem Auftreten in Kenia oder Tansania könnte zum Teil ebenfalls gerechnet werden.

Résumé

La faune scorpionique de la région du Kenya et de la Tanzanie est composée de 25 «formes» différentes qui sont incluses dans une clé de détermination illustrée. Ces «formes» appartiennent à 2 familles, celles des Buthidae et des Scorpionidae, et représentent 11 genres et 23 espèces, dont l'une en 3 sous-espèces.

Une «check-list» fournie des généralités sur des caractères morphologiques externes et la répartition de ces scorpions. Une liste supplémentaire contient les genres et espèces rapportés pour les pays voisins mais qui ne sont pas connus du Kenya et de la Tanzanie jusqu'à présent.