Description of two new species of Xevioso (Araneae: Phyxelididae) from Southern Africa, with the northernmost localities for the genus

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Abstract. Two new species of Phyxelididae are described from southern Africa: Xevioso cepfi sp. nov. (♂♀), from mountains in the Niassa Province of northern Mozambique, and X. megcummingae sp. nov. (♂♀), from urban Harare, northern Zimbabwe and the Viphya Mts in Malawi. They represent the northernmost localities of the genus. An identification key, partially adapted for the new species, is presented. The biogeographical importance of the mountain areas on both sides of the northern part of Lake Malawi is discussed.

Keywords. Afromontane, Mozambique, spider, taxonomy, Zimbabwe.

Introduction

Phyxelididae is a fairly small spider family with 14 genera and only 64 species. It has a peculiar distribution, mainly in southern and eastern Africa and Madagascar, with a few outliers in Turkey and Indonesia. It retained subfamily status in the complete revision by Griswold (1990) but received family status in the study of Griswold et al. (2005).

One of the largest genera, Xevioso Lehtinen, 1967, currently contains nine nominal species (Griswold 1990). Key characteristics of the genus include a well-developed cup-like sclerotized conductor housing a spiral screw-like embolus, unique among the Phyxelididae. The basal embolic sclerite (EBS) can be simple or tripartite, and the tegulum may have a maximum of four processes (see Griswold 1990 for a detailed generic treatment).
Xevioso was so far restricted to Southern Africa, with one species extending its area into Zimbabwe (X. orthomeles Griswold, 1990) and one (X. jocquei Griswold, 1990) widely separated from the rest in Malawi.

During a BINCO-expedition (see BINCO.eu) in November 2016 to the remote mountains of Chitagal, Sanga and the Njesi Plateau (Niassa Province) in northern Mozambique (Jones et al. 2017), an undescribed species of Xevioso was found. Further evaluation of the Phyzelididae collection in the Royal Museum for Central Africa (RMCA) uncovered a male and female of a second remarkable species from Zimbabwe, with one more specimen from the Viphya Mts in Malawi.

Knowledge on the distribution of the genus is greatly expanded here with the addition of two new species: one in northern Mozambique and another with a remarkable distribution, in northern Zimbabwe and a remote locality in Malawi. Herein, we describe and illustrate these new species and thus provide the northernmost localities for the genus.

Material and methods

The specimens examined in the current study were preserved in 70% ethanol and examined using a Nikon SMZ800 stereo microscope for measurements and descriptions. Male palps and female genitalia were drawn with a WILD M10 stereo microscope (Leica). Female epigynes were detached from the abdomen, temporarily mounted in a clearing mixture of methyl salicylate and cedukol (Merck, Darmstadt) and observed with a Leitz Dialux 22 microscope and subject to automontage with the Syncroscopy software. Male palps and habitus were photographed with a Leica MZ16 using the Leica Application Suite (LAS) automontage software (ver. 3.8; Leica, https://leicacamera.com), with a Z-stack of 15–25 images merged into a single photomontage. For SEM photos, specimens were dried overnight in hexamethyldisilazane, gold coated, and examined and photographed with a JEOL 6480 LV scanning electron microscope. Maps were created with the online tool SimpleMappr (Shorthouse 2010).

All types are deposited in the Royal Belgian Institute of Natural Sciences (RBINS Brussels, Belgium). Specimens are deposited in the Royal Museum for Central Africa (RMCA, Tervuren, Belgium) and in the Museu de História Natural de Maputo (MHNM, Maputo, Mozambique).

All measurements are given in millimetres (mm).

Abbreviations (following abbreviations used in Griswold 1990)

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<tr>
<td>ALE</td>
<td>anterior lateral eyes</td>
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<tr>
<td>AME</td>
<td>anterior median eyes</td>
</tr>
<tr>
<td>CO</td>
<td>copulatory opening</td>
</tr>
<tr>
<td>d</td>
<td>dorsal</td>
</tr>
<tr>
<td>DP</td>
<td>setose posterodorsal process of male palpal tibia</td>
</tr>
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<td>disp</td>
<td>dispersed</td>
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<tr>
<td>dw</td>
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<td>EBM</td>
<td>median division of EBS</td>
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<td>EBA1, 2 and 3</td>
<td>mesal, lateral and median branch of tripartite EBS</td>
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<td>EBS</td>
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PML = posterior median lobe of epigyne
rl = retrolateral
TA2 = central tegular process
TA3 = retrolateral tegular process
T = tibia
t = tarsus
TL = total length

Results

**Taxonomy**

Class Arachnida Cuvier, 1812
Order Araneae Clerck, 1757
Family Phyxelididae Lehtinen, 1967
Genus *Xevioso* Lehtinen, 1967

*Xevioso cepfi* sp. nov. [urn:lsid:zoobank.org:act:500CF91F-7D90-466F-88F3-1E48938DF676](urn:lsid:zoobank.org:act:500CF91F-7D90-466F-88F3-1E48938DF676)

Figs 1–3, 4A, D, 5, 8

**Diagnosis**

Males of *X. cepfi* sp. nov. can be recognized by the axel-shaped, dark dorsal asetose process of the palpal T, which is thin and transparent in *X. jocquei*, combined with the pronounced, blunt DP (Figs 1C, 3B–C, 4A) and the palpal bulb with sharp bifid tegular process on TA3 which is shorter and blunt in *X. jocquei*. Females are characterized by the double coil of the copulatory duct, the anterior median duct of the spermathecae being almost twice as large as the posterolateral duct, also the anterior median duct converging centrally and almost touching (Fig. 5B–C).

**Etymology**

Named after the Critical Ecosystem Partnership Fund (CEPF), funders of the Njesi BINCO expedition, during which this species was discovered.

**Material examined**

**Holotype**

MOZAMBIQUE • ♂; Niassa Region, Sanga Plateau; 12°22.580 S, 35°20.013 E; 1724 m a.s.l.; 18 Nov. 2016; L. Geeraert and M. Jocqué leg.; forest; pitfall with fence; RMCA_ARA_245493.

**Paratypes**

MOZAMBIQUE • 1 ♀; Niassa Region, Sanga Plateau; 12°22.5802 S, 35°20.0132 E; 1724 m a.s.l.; 15 Nov. 2016; L. Geeraert and M. Jocqué leg.; forest; pitfall with fence; RMCA_ARA_246405 • 3♂♂; same collection data as for preceding; RMCA_ARA_245506 • 2♂♂; same collection data as for preceding; MHNMM • 1 ♀; Niassa Region, Sanga Plateau; 12°24.007′ S, 35°20.070′ E; 16 Nov. 2016; L. Geeraert and M. Jocqué leg.; forest; pitfall with fence; RMCA_ARA_245496 • 2♂♂; Niassa Region, Chitagal Plateau; 12°35.4952 S, 35°15.1342 E, 1624 m a.s.l.; Nov. 2016; montane forest; pitfall for herpetology; L. Geeraert and M. Jocqué leg. RMCA_ARA_245487.

**Other material**

MOZAMBIQUE • 2♂♂; Niassa Region, Sanga Plateau; 12°24.0072 S, 35°20.0702 E; 16 Nov. 2016; montane forest; L. Geeraert and M. Jocqué leg.; pitfall for herpetology; RMCA_ARA_246548 • 2♂♂; Niassa Region, Sanga Plateau; 12°22.5802 S, 35°20.0132 E; 1724 m a.s.l.; 14 Nov. 2016;
forest; pitfall; L. Geeraert and M. Jocqué leg.; RMCA_ARA_246550 • 1 ♂; same collection data as for preceding; RMCA_ARA_246551 • 2 ♂♂; same collection data as for preceding; 18 Nov. 2016; RMCA_ARA_246552 • 2 ♂♂; same collection data as for preceding; RMCA_ARA_246553 • 1 ♂; Niassa Region, Chitagal Plateau; 12°35.495′ S, 35°15.134′ E; 1624 m a.s.l.; 8 Nov. 2016; L. Geeraert and M. Jocqué leg.; montane forest; pitfall; RMCA_ARA_246554 • 1 ♂; same collection data as for preceding.

Fig. 1. Xevioso cepfi sp. nov., holotype, ♂ (RMCA_ARA_245493). A. Habitus, ventral view. B. Habitus, dorsal view. C. Palp, retrolateral view. D. Palp, ventral view. Scale bars: A–B = 1 mm; C–D = 200 μm.
Fig. 2. *Xevioso cepfi* sp. nov., ♂, paratype (RMCA_ARA_245487). A. Palp, ventral view. B. Palp, as preceding, detail. C. Palp, retrolateral view. Abbreviations: EBS = basal embolic sclerite; E = embolus; TA2, TA3 = tegular apophyses 2 and 3. Scale bars = 100 μm.
Description

**Male holotype**

**Total length.** 4.60. Carapace: length 2.15, width 1.68, height 1.63.

**Colour** (Fig. 1A–B). Carapace light yellowish-brown, lighter posteriorly, shading to dark brownish-orange at pars cephalica, blackened around eyes and between AME. Co and Tr concolorous with posterior region of carapace, remainder of legs darkened to pale brownish-orange at tip of each metatarsus. Chelicerae darkest part of body, dark red-brown, with clypeus orange-brown. Sternum cream yellow. Dorsum of abdomen grey, venter pale grey, with some paler areas, pedicel concolorous with sternum.

**Carapace.** Margins weakly sinuate, with very sparse short setae. Carapace with highest point in cephalic area, 1.5 times higher than at fovea (1.63 vs 1.04).

**Eyes.** ALE 0.11; AME 0.10; PLE 0.06; PME 0.06; ALE-AME 0.05; AME-AME 0.03; PME-PME 0.12.

**Fig. 3.** *Xevioso cepfi* sp. nov., holotype, ♂ (RMCA_ARA_245493). **A.** Palp, ventral view. **B.** Palp, retrolateral view. **C.** Palpal tibia, dorsal view. Abbreviations: EBS = basal embolic sclerite; E = embolus; CL = lateral ridge of conductor; TA2, TA3, TA4 = tegular apophyses 2, 3 and 4. Scale bars = 200 μm.
CHELICERAE. Promargin with six teeth, three smallest distally and three larger proximally, with the median of the larger teeth being largest. Retromargin with four small and one large tooth.

ABDOMEN. With short black setae, denser laterally and longest at posterior apex. Venter with dispersed setae, longest at posterior apex.

LEGS. Formula 1423, F 1 thicker, weakly undulated. P with small but distinct retrolateral process/protrusion. Mt I with very weak pl concavity ⅔ towards apex (fig. 4D).

LEG MEASUREMENTS.

<table>
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<tr>
<th></th>
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Spination. Leg I: F = pl1, T = v3, Mt = v4; Leg II: F = pl1, T = pl1 v2, Mt = pl1 rl1 v3; Leg III: T = pl2 rl2 v2; Leg IV: T = pl1 d2 rl1 v3.

Sternum (Fig. 1A). 1.2 long, 0.92 wide. Shield-shaped, with slightly sinuous lateral margins. Black setae longer at margins and without setae centrally. No precoxal sclerites.

Palp (Figs 1C–D, 2A–C, 3A–C, 4A). F with two short stout anterobasal thorns. T with strong, dark axle-shaped process and pronounced DP, delimiting concavity with narrow opening. Palpal bulb simple, not divided into basal and retrobasal lobes. Embolus broadest at base but tapered apically into slender corkscrew, with three coils. TA3 with two acutely pointed prongs, TA2 lobate with short, blunt tip. EBS tri-partite, EBA1 sub-quadrate with weak posterior point, EBA2 recurved and slender, EBA3 fine and serrated with apex curving dorsally. Conductor with rl transverse ridge, basocentral lobe distad of embolus, and lateral and apical fringe.

Female paratype

Total length. 4.45. Carapace length 2.04. Carapace width 1.45. Carapace height 1.12.

Fig. 5. Xevioso cephi sp. nov., ♀, paratype (RMCA_ARA_245496), epigyne. A–B. Ventral view. C. Cleared, ventral view. D. Cleared, dorsal view. Abbreviations: CO = copulatory opening; PC = posterior chamber; PML = posterior median lobe. Scale bars = 200 μm.
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**COLOUR.** Carapace uniform, creamy yellow-brown. Clypeus from AME’s darker, orange-brown, thin line around margin of clypeus black. Chelicerae substantially darker, a deep reddish brown. Legs concolorous with carapace, except leg I: darkening at Mt a deep orange. Abdomen grey with short black setae, venter paler grey, creamy at anterior margin with pedicel concolorous with carapace base.

**CARAPACE.** Margins very weakly sinuate, if at all. Sparse black setae reach highest abundance medially, anterior of the fovea.

**EYES.** ALE 0.08; AME 0.09; PLE 0.07; PME 0.06; ALE-AME 0.06; AME-AME 0.04; PME-PME 0.12

**CHELICERAE.** Promargin with four teeth, retromargin with six small teeth

**ABDOMEN.** Venter light grey to cream at anterior, with short black setae uniform throughout, getting only marginally longer at the posterior end.

**LEGS.** Formula 143? (missing leg II). F I undulates weakly ⅔ of length toward apex. As in males, distinct but small rl process/ protrusion at pa. Females lack pl concavity at the mt present in males.

**LEG MEASUREMENTS.**

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**SPINATION.** Leg I: F = pl1, T = v1, Mt = v3; Leg III: F = pl2 rl1 v1, Mt = 3disp, 4dw; Leg IV: T= rl1 v1, Mt = 4disp, 4dw.

**STERNUM.** Roughly shield-shaped, straight at anterior margin. Black setae at margins but without setae centrally. 1.10 long and 0.94 wide.

**EPIGYNE** (Fig. 5A–D). Posterior median lobe of epigyne twice as wide as long, widest at lateral midpoint. Vulva with spermathecae cylindrical, with external spiral of three turns. Anterior median duct of spermathecae converge slightly at anterior apex, towards touching from lateral. Dorsal posterior chambers face laterally.

*Xevioso megcumingae* sp. nov.  urn:lsid:zoobank.org:act:DD398E33-4DA0-45C2-9079-B009CD955541  Figs 4C, 6–8

**Diagnosis**

Males of *X. cumingae* sp. nov. can be distinguished from others in the genus by the following character combination: (1) Mt I modified, with strong and broad d process ⅔ towards apex, about double the height of Mt apex; (2) palpal T with dorsal hyaline process thin, slightly curved, appearing nail-like in rl view; (3) palpal DP broad and sub-triangular; (4) TA3 tegular processes short and blunt; TA1 absent. Females are recognized by the CO far apart and the longitudinal axis of the spermathecae diverging anteriad.
Etymology
The species name is a matronym in honour of Zimbabwean naturalist, Meg Cumming, collector of the type material.

Material examined

Holotype
ZIMBABWE • ♂; Harare, Walmer Drive; 17°48.4802 S, 31°05.8202 E; 1535 m a.s.l.; 19 Oct. 2002; M. Cumming leg.; garden; RMCA_ARA_236654.

Paratype
ZIMBABWE • 1 ♀; same collection data as for holotype; 19 Apr. 2005; RMCA_ARA_236655.

Other material

Description

Male holotype
**Total length.** 6.85. Carapace length 2.92. Carapace width 2.44. Carapace height 1.36.

**Colour (Fig. 6A).** Carapace light yellowish-orange, darkened anteriorly at pars cephalica, chelicerae deep reddish-brown, darkest part of the body; black pigment around eyes, PME without black pigment, AME’s joined by dark pigment. Sternum light yellow, margins darkened to deep reddish-brown. Co and Tr I brownish-orange, darker than others, cream yellow. F I orange, to brownish-orange up to Mt; other legs light brownish-yellow to orange at Mt. Abdomen and venter cream to white entirely.

**Carapace.** Margin weakly sinuate. Short black setae dispersed in irregular and sparse patches. Fovea deeply concave, carapace flat throughout, clypeus height 1.1 × height of carapace at fovea.

**Eyes.** ALE 0.10; AME 0.10; PLE 0.10; PME 0.08; AME-AME 0.04; PME-PME 0.17.

**Abdomen.** Black setae regularly spaced throughout (both dorsally and ventrally), setae longer posteriorly, reaching 0.4.

**Legs (Fig. 6B–C).** Formula 1423, with leg III distinctly shortened. Leg I modified at metatarsus, with strong kink extending dorsally, creating metatarsal process at least twice as high as apical end of metatarsus.

**Leg measurements.**

<table>
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<td>3.20</td>
<td>1.13</td>
<td>12.17</td>
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</table>

**Spination.** Leg I: F = pl1, T = pl2 rl1 v1, Mt = pl2 v2; Leg II: F = pl1, T = pl2 r2 v5, Mt = pl1 d1 rl4 v2; Leg III: F = pl1 d3 rl1, T = d2 rl2 v2, Mt = 3disp 6dw; Leg IV: F = pl1, T = pl2 r2 v3, Mt = 2d, 5dw.
Fig. 6. *Xevioso megcumingae* sp. nov. A–E. Male holotype (RMCA_ARA_236654). F–G. Male paratype (RMCA_ARA_236655). A. Male habitus, dorsal view. B. MtI, prolateral view. C. MtI, retrolateral view. D. Palp, ventral view. E. Palp, retrolateral view. F. Epigyne, ventral view. G. Epigyne, dorsal view. Scale bars: A = 1 mm; B–C = 0.5 mm; D–E = 200 μm; F–G = 100 μm.
Sternum. Roughly oval and distinctly jagged at coxae. 1.61 long and 1.32 wide. Black setae interspersed laterally, with very few medially.

Palp (Figs 4C, 6D–E, 7A–C). F with dorsal hyaline asetose process slender, curved at extremity, with broad DP delimiting widely open, shallow concavity (Figs 4C, 6E). Embolus turning three times, tapering to acutely pointed corkscrew apex; thickest just before first turn. Tegulum simple, without basal or retrobasal lobes. TA3 with two short, blunt projections; EBS poorly sclerotized, tripartite, EBA1 narrower at apex, almost touching embolus, EBA2 rounded.

**Female paratype**


**Colour.** Carapace creamy yellow throughout, darkening to light-orange at clypeus dorsally. Chelicerae boss orange to brown, darkest part of body. Femora lightest, darkening to a deep orange-brown at metatarsi. Abdomen uniform light grey to cream.

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**Fig. 7. Xevioso megcummingae** sp. nov. A–C. Holotype, ♂ (RMCA_ARA_236654). D. Paratype, ♀ (RMCA_ARA_236655). A. Palp, ventral view. B. Palp, lateral view. C. Palp, dorsal view. D. Epigyne, ventral view. Abbreviations: EBS = basal embolic sclerite; E = embolus; CL = lateral ridge of conductor; TA3, TA4 = tegular apophyses 3 and 4. Scale bars: A–C = 500 μm; D = 100 μm.
Carapace. Weakly sinuate with short black setae posterior of the fovea. Fovea moderately depressed.

Eyes. ALE 0.07; AME 0.05; PLE 0.04; PME 0.07; ALE-AME 0.08; AME-AME 0.04; PME-PME 0.12

Chelicerae. Strong. 1.30 long, seven teeth present on both promargin and retromargin, promargin with two larger proximal teeth, retromargin all teeth small. Endites with translucent subdecumbent setae.

Abdomen. Dorsum with very few setae anteriorly, denser on posterior part. Venter with minimal short fine setae.

Legs. Formula 123? (legs IV are missing), without pl concavity on metatarsi I as in male.

Leg Measurements.

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Spination. Leg I: F = pl1, T = pl2 v3, Mt = pl2 rl1 v5; Leg II: F = pl1 d1, T = pl2 v1, Mt = pl2 rl1 v3; Leg III: F = pl1 rl1, T = pl3 d1 rl1 v2, Mt = disp3 dw4.

Sternum. 1.21 long, 0.91 wide. Shield-shaped; with some short black setae.

Palm. With dense procurred setae and toothless claw.

Epigyne (Figs 6F–G, 7D). PML of epigyne wider than long. Copulatory openings far apart, situated on lateral side of epigyne; spermathecae diverging anteriad; fertilization duct leading medially and posteriad from spermathecae.

Variation

The male specimen from Malawi (RMCA_ARA_153025) is smaller and paler than the holotype. Total length 3.12 (the abdomen has shrunk); carapace length 1.99, width 1.35, height 0.92.

Xevioso jocquei Griswold, 1990
Figs 4B, E, 8

Material examined

MALAWI • holotype ♀; Mt Mulanje, Lichenya Plateau; 16°00' S, 35°30' E; 2000 m a.s.l.; 7–23 Nov. 1981; R. Jocqué leg.; seepage area with grassy vegetation; pitfalls; RMCA_ARA_156494.

Key to the species of Xevioso (modified from Griswold 1990)

Note: figures denoted ‘*fig.’ refer to figures in Griswold (1990).

1. Males .................................................................................................................. 2
   – Females ........................................................................................................... 12

2. Metatarsus I without dorsomedian projection .................................................. 3
   – Metatarsus I with dorsomedian projection (*figs 33, 44) ............................. 5
3. Tegulum (*fig. 34a) divided into basal lobe and projecting TA3; TA 1 present; apex of EBS simple ................................................................. X. orthomeles Griswold, 1990
   – Tegulum (*fig. 46a) simple, without basal lobe, TA3 not protruding; TA1 absent; apex of EBS tripartite .............................................. 4

4. Modification of Mt I subtle, hardly discernable (Fig. 4D); TA3 with two sharp prongs (Figs 1C–D, 3A–B), dorsal apophysis of palpal tibia axe-shaped, delimiting rounded invagination with narrow opening (Figs 1C, 3B–C, 4A) ........................................... X. cepfi sp. nov.
   – Mt I clearly narrowed in center (Fig. 4E); TA3 with blunt prongs; dorsal apophysis of palpal tibia sinuous, delimiting oval invagination with broad opening (Fig. 4B) …… X. jocquei Griswold, 1990

5. Tegulum (Figs 6D, 7A) simple, without basal lobe, TA3 not protruding; apex of EBS tripartite; apophysis of palpal tibia sinuous (Figs 4C, 7B–C) delimiting oval invagination with broad opening ................................................................. X. megcummingae sp. nov.
   – Tegulum (*fig. 34a) divided into basal lobe and projecting TA3 ................................................................. 6

6. Palpal tibia with no more than 1 elongate apical process, DA unmodified; embolic spiral much narrower than width of cymbium; conductor without hook; metatarsus I with 1 distinct dorsal process ................................................................... 7
   – Palpal tibia with 2 widely separated processes (*fig. 37b): an elongate DA and acutely pointed median D process; embolus a broad spiral covering width of cymbium (*fig. 37a); conductor with proximal median hook; metatarsus I with 2 distinct dorsal processes (*fig. 33a) …… X. zuluana (Lawrence, 1939)

7. Metatarsus I with an acute dorsal spur (*fig. 40a–d); palpal tibia with DAS produced into a long, sharp point (*fig. 41b); embolus making less than 1 full turn ........................................... 8
   – Metatarsus I dorsal projection broad and triangular; palpal tibia with DA rounded and unmodified (*fig. 29c); embolus making more than 1 full turn (*fig. 29b) ................................................................. 9

8. Palpal tibia with hyaline D reduced to a vestige or lost, DAS extending far beyond margin of hyaline D (*fig. 39b); TA3a very long, pointed (*fig. 39c); TA 1 present, slender; proximal margin of conductor transverse, unmodified (*fig. 39a); metatarsus I with fine spinules …… X. aululata Griswold, 1990
   – Palpal tibia with hyaline D extending for full length of DA, reaching apex of DAS; TA3a short, conical (*fig. 41c); TA1 absent; proximal margin of conductor with an acute, proximad-directed flange (*fig. 41a); metatarsus I with stout spinules ..............................X. colobata Griswold, 1990

9. Palpal tibia with hyaline D broad, margin gently curved or angled (*fig. 45b); apex of EBS bifid (*fig. 42a); embolus with lamella for much of length (*fig. 45a); TA1 slender and elongate (*fig. 42c) .................................................................................................................. 10
   – Palpal tibia with hyaline D having a slender median flange (Df) projecting distally (*figs 29c, 32b); apex of EBS simple (*fig. 29b); embolus with lamella only at base; TA 1 broad (*figs 29e, 32a) ... 11

10. Conductor with acute proximal flange (*fig. 45c); palpal tibia with hyaline D angled (*fig. 45b) .... ................................................................. X. kulufa Griswold, 1990
    – Conductor without proximal projection (*fig. 42c); palpal tibia with hyaline D evenly curved (*fig. 42b) .............................................. X. lichmadina Griswold, 1990

11. Tegulum with TA3a broad, short, conical, apex bifid (*figs 32a, c) ......................................................................................... X. tuberculata (Lawrence, 1939)
    – Tegulum with TA3a narrow, elongate, apex acutely pointed (*figs 36a, c) ................................................................. X. amica Griswold, 1990
12. Ratio of PML length to width greater than 1 .................................................. 13
   – Ratio of PML length to width less than 1 ...................................................... 14

13. Ratio of PML length to width greater than 2 (*fig. 43a) .................................. X. lichmadina Griswold, 1990
   – Ratio of PML length to width less than 2 (*fig. 43b) ..................................... X. kulufa Griswold, 1990

14. Epigynum simple, without paired lobes or secondary depressions; copulatory duct small, straight or curved and horn shaped ................................................................. 15
   – Epigynum with paired raised median lobes and shallow paired anterior depressions; copulatory duct very large, spherical, length nearly equal to that of spermathecal capsule (*fig. 38b) ........
     .................................................................................................................. X. zuluana (Lawrence, 1939)

15. Epigynum flat to convex, with lateral margins of PML curved outward posteriorly; spermathecae with spiral duct ................................................................. X. aulutata Griswold, 1990
   – Epigynum with transverse median ridge, lateral margins of PML straight; spermathecae with simple spherical chamber (*figs 12d, 38c) ................................. X. amica Griswold, 1990

16. Copulatory duct large, hornlike, expanded proximally ................................... 17
   – Copulatory duct small, ringlike ........................................................................ 19

17. Diameter of copulatory duct much greater than that of spiral spermathecal chamber (*fig. 35e) ..... X. megcumingae sp. nov.
   – Diameter of copulatory duct about equal to that of spiral spermathecal chamber ................................................. 18

18. Spiral spermathecal chamber almost touching medially with anterior bulb spherical spermathecae (Fig. 6F–G). CO far apart ................................................................. X. orthomeles Griswold, 1990
   – Spiral spermathecal chamber not close to touching medially, without bulb spherical spermathecae head (*fig. 35d) ............................................................ X. cepfi sp. nov.

19. Spermathecal chamber with 4-5 turns, copulatory duct small and thin (*fig.39f) ........
    .................................................................................................................. X. tuberculata (Lawrence, 1939)
   – Epigyne with copulatory opening with distinct sinuation posteriorly (Fig. 5A). Spermathecal chamber with 3 turns (Fig. 5C), copulatory duct expanding widely, wider than spermathecae (Fig. 5B–C) ... X. cepfi sp. nov.

**Discussion**

It is well known that the mountain fauna and flora of the South African mountains ranging from the Western Cape in the south-west to the Limpopo Province in the north, are unique and have a high proportion of endemic species (Axelrod & Raven 1978). The Limpopo appears to be a natural boundary for most of the southern organisms absent in tropical Africa. However, there are a number of elements that are typical of the Cape fauna occurring north of the Limpopo on inselbergs in Malawi and Mozambique, reaching their northernmost limit there. The geological background of this phenomenon is explained in Axelrod & Raven (1978) and Delvaux (2001). The cedars of the genus *Widdringtonia* Endl. are an outstanding botanical example, as they reach their northernmost distribution on Mt Mulanje (Malawi) (Pauw & Lindner 1997), a well-known large inselberg with an altitude of about 3000 m. It harbours numerous representatives of taxa with a southern African distribution (Strugnell 2002). Among these is *Sphaerotherium transzambeziacum* Jocqué, 1984, a pill millipede belonging to a family that otherwise occurs only south of the Zambezi River (Jocqué 1984). Two more inselbergs at about the same latitude just across the border in Mozambique are Mt Namuli and Mt Mabu, which have been inventoried for invertebrates, but only superficially (Timberlake *et al.* 2009, 2012).
It has been questioned whether these inselbergs are the northernmost high-altitude leftovers of a fauna that had a strong connection with the Cape fauna (Jocqué 1983, 1984). The case of Xevioso, which clearly has its center of distribution in eastern South Africa, is interesting in this context. The species X. jocquei was considered as an anomaly as far as its distribution is concerned, but it could be explained as a high altitude remnant of a once larger area. It now appears that two more species are found much further north in mountain areas in northern Mozambique and Malawi, on both sides of Lake Malawi, and that the genus has a much larger distribution (Fig. 8). Xevioso cepfi sp. nov. has been collected on all plateaus of the Mozambique Niassa Region at altitudes between 1600 and 1800 m a.s.l. A first hint of the geographic importance of these highlands was already suggested by the inventory of mammals (van Berkel et al. 2019) and reptiles (Bayliss et al. 2014). It has been corroborated by the find of a representative of the genus Cicynethus Simon, 1910 (C. mossambicus Jocqué & Henrard, 2018), widely separated from C. acer Jocqué & Henrard, 2018, its nearest relative in South Africa (Jocqué &

Fig. 8. Distribution. Xevioso cepfi sp. nov. (▲), Xevioso jocquei Griswold, 1990 (■), Xevioso megcummingae sp. nov. (●).
Henrard 2018). The find of *X. megcummingae* sp. nov. at quite a distance from the type locality, shows that the Viphya Mts in Central Malawi may also harbour more interesting endemics.

Our study confirms the importance of these remote altitudinal ranges for the understanding of distribution patterns of southern African taxa with a predilection for montane habitats.

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**References**


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