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RESEARCH ARTICLE

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New macropterous leafhopper genera and species within the tribe Bonaspeiini from the Fynbos biome of South Africa (Insecta, Hemiptera, Auchenorrhyncha, Cicadellidae)

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Abstract
Two new genera of macropterous leafhoppers, tentatively included in the tribe Bonaspeiini Zahniser and Dietrich (2013) from the Fynbos biome of south-western parts of South Africa, are described. These are *Retevolatus* **gen. nov.** with type species *R. flexiverpus* **sp. nov.**, *R. semicurviverpus* **sp. nov.** and *R. subspiniverpus* **sp. nov.** and *Flavorubivolatus* **gen. nov.** with type species *F. glabriverpus* **sp. nov.** and *F. tensiverpus* **sp. nov.** and *F. curtiverpus* **sp. nov.** Collection records and distribution modelling confirmed that species of both genera occur within a confined region of south-western parts of South Africa.

Keywords
Afrotropical Region, Cape Floristic Region, phytophagous, shrub association

Introduction

This is another contribution to the study of leafhoppers (Insecta, Hemiptera, Auchenorrhyncha, Cicadellidae) in the Fynbos Biome of South Africa. Theron (1970, 1972, 1973, 1974, 1975, 1978, 1979, 1980, 1983, 1984a, 1984b, 1986) and Davies (1987, 1988a, b; Davies and Geertsema 1998) described many species, but museum holdings and field work has revealed numerous new species. Many other new species in the South African Savanna biome with similar external appearance to these Fynbos leafhoppers requires ongoing examination of species and generic concepts. Zahniser and Dietrich (2013) placed 21 South African leafhopper genera, mostly described by Theron and Davies (op. sit.), into a new tribe Bonaspeiini. Recent additions were *Bretega* Stiller, 2016, *Discolopeus* Stiller, 2019 and *Geelus* Stiller, 2020. The majority of Bonaspeiini do not fly, i.e. have short wings, at least with reduced hind wings, with a wide range of shrub associations. They are distributed in the Western Cape Province of South Africa, generally in the Fynbos Biome and adjacent biomes such as the Succulent Karoo, Nama-Karoo and Albany Thicket Biomes. Exceptional in the tribe is the macroptery of *Renosteria* Theron, 1984a that is associated with *Dicerothamnus rhinocerotis* (Asteraceae), a wide-spread, ruderal shrub in these biomes and threatened in agroecosystems (Mucina and Rutherford 2006). Additionally, *Capeolix* Linnavuori, 1961, *Discolopeus, Geelus* and *Kimbella* Davies, 1988b have fully developed hind wings and tegmina as long as or longer than the abdomen. Male genitalia were and still are the best means of identification, with color and body shape generally not a reliable feature. The new genera described here are also macropterous, with *Flavorubivolatus* gen. nov. displaying a number of superficial similarities with *Renosteria*, but not associated with the same host plant. The other new genus, *Retevolatus* gen. nov., is distinct with overlapping distribution with the former new genus. Tribal placement of the new genera is not fully resolved due to the ambiguous definitions of Bonaspeiini and Athysanini in Zahniser and Dietrich (2013) which bear a number of similarities.

Material and methods

Numbers of examined specimens were 102 males and 74 females of *Retevolatus* and 51 males, 59 females and 14 nymphs of *Flavorubivolatus*. Dissections were made of KOH macerated specimens and examined under glycerine. Drawings were traced through camera lucida. Images were produced with Zeiss Axio Zoom V16 and Zeiss Axio Imager2 with Axiocam MRc camera. Image adjustments included crop, color brightness and contrast and unsharpen mask. Morphological terms mainly follow Blocker and Triplehorn (1985), Zahniser and Dietrich (2008) and Stiller 2016, Stiller 2019a, Stiller 2019b, chaetotaxy follows Rakitov (1997). Measurements included length from apex of crown to apex of tegmina, crown median length, crown length perpendicularly next to compound eye, pronotum length, head width across eyes, pronotum width, ocellus diameter and interocular distance between ocellus and compound eye. They were made with an eyepiece graticule, calibrated by a 2 mm scale on a microscope slide. Smallest measurements made at 70x magnification were converted to micrometers by multiplication with 14 or to millimeters by multiplication with 0.014. Measurements of the style were the sagittal length from the apex of the apophysis to the anterior margin of the medial arm and the greatest width across the base, between the medial and lateral arms, used as a length to width ratio. Connective measurements included width of the stem at its apex, greatest width across arms, length of stem from apex to base of arms (bottom of cavity between arms) and length of arms from apex of arms to bottom of cavity between arms. Measurements of the subgenital plate were the width at the base (confluence of subgenital plate and valve) and the length medially from the base to the apex. The crown angle, in part, at the apex of the head was calculated by trigonometry, specifically tangent, using crown median length and half head width across eyes, as adjacent and opposite sides of a right-angled triangle, and doubled for both sides. In the lateral view of the aedeagus the curvature was calculated as the angle subtended by its arc, using segment height and chord length of the arc in an online calculator (circular segment, online calculators, https://planetcalc.com/1421/; accessed 04/08/2020).

Holotypes are deposited in **SANC** (The National Collection of Insects, Pretoria, RSA, same address as author address). Representatives of long series of paratypes will be deposited in the **BMNH** (The Natural History Museum, London, UK), **INHS** (Illinois Natural History Survey, Campaign, Illinois, USA) and SANC.

Distribution analysis was done in Diva GIS and MaxEnt (Phillips et al. 2020) with *Retevolatus flexiverpus* sp. nov. and *Flavorubivolatus glabriverpus* sp. nov. For the analysis, distribution files were comma separated values, 19 bioclimatic worldclim (https://www.worldclim.org/) variables and 10 percentile training presence. Maps in Fig. 18A, B were compiled with DIVA GIS (methods in Scheldeman and Van Zonneveld 2010). Distribution data in Appendix I.

Results

***Retevolatus* gen. nov.**
http://zoobank.org/81FAE41D-B7E3-4E1D-A58A-55DD586D1977
Figures 1–9

Type species. *Retevolatus flexiverpus* sp. nov. by present designation.

Diagnosis. Male and female elongate, macropterous, 5.0–6.0 mm long, with brown to dark brown vermiculous or irrorate color pattern on tegmina, crown apically with paired rhomboid or amorphous dark brown markings (Figs 1A–I, 2A–C), in lateral view with margin at crown rounded, above submargin and disc, disc flat (Fig. 1C). Crown narrowly rounded to face, anterodorsal margin shagreened. Male subgenital plate with uniseriate lateral macrosetae (Figs 6H, 8I, 9H). Pygofer lobe either with serrate posterior process variable in shape and orientation or acute subapical or basal process. Aedeagus with shaft tubular, curvate, concave, with single apical (Figs 6A, B, 8A) or subapical process (Fig. 9A), directed anteriad or dorsoanteriad. Female with sternite 7 with shallow (Fig. 9J) or deep, wide V-shaped (Fig. 6M, N) or globular notch (Fig. 8J).

Figure 1. Habitus of *Retevolatus flexiverpus* gen. nov. & sp. nov. specimens from selected localities **A** dorsal, Klipheuwel, male **B** dorsal, Piketberg, female **C** lateral, Piketberg, female **D** dorsal, Cedarberg, female **E** dorsal, Driehoek farm, female **F** dorsal, Klipheuwel, male **G** dorsal, Brakwater, head, pronotum and scutellum, male **H** dorsal, Klipheuwel, male **I** dorsal, Citrusdal, male. Scale bars: 1 mm (**A–F, H, I**), 0.5 mm (**G**).

Male and female. Color. Base color ochraceous to stramineous. Crown with paired rhomboid or amorphous dark brown markings at apex (Figs 1A–I, 2A–C). Pronotum with light brown and dark brown markings, variable in size and shape (Figs 1A–I, 2A–C). Scutellum with light brown scutellar triangles, medially stramineous with dark brown paired markings and brown suture (Figs 1A–I, 2A–C). Tegmina uniformly reticulate and irrorate, costal cells and fourth apical cell sometimes with dark brown markings; vannal cells at margin variable, sometimes unmarked (e.g. Figs 1E, 2A) or whitish (e.g. Figs 1A, H, 2C). Legs ochraceous to stramineous; subapical brown, irregular band on pro- and meso-femur; metafemur with brown longitudinal line at apex; all tibia with areola of setae embrowned.

Measurements. All specimens of all species. Length from apex of crown to apex of tegmina 4.97–6.00 mm. Crown length medially 0.37–0.45 mm. Crown length next to eye 0.30–0.35 mm. Pronotum length 0.56–0.65 mm. Head width across eyes 1.33–1.53 mm. Pronotum width 1.24–1.43 mm. Ocellus diameter 46.3–61.1 µm; interocular distance 83.8–107.8 µm. Crown angle 117.0–122.9°.

Wings. Tegmina with four apical cells; outer and central anteapical cells, inner anteapical cell and inner discal cells merged (Fig. 7L). Hind wing with vannal lobe large, greatest length 0.4 times greatest width of hind wing, four apical cells (Fig. 7M).

Profemur. Anteromedial margin with basal AV setae short, 10–12 spine-like; intercalary setae disjunct without AV_1 differentiation, 9–11, subapical AM_1 longer and thicker than any setae in IC.

Metatibia. Setal formula at apex 2+2+1; apical pair subequal, shorter than long median seta, median setae with one very long and the other very narrow and about half as long. Basal seta subequal to long median seta.

Metatarsi. Metatarsus 1 apex with four rounded platellae and one acute platella; metatarsus 2 apex with two lateral acute and two medial, rounded platellae.

Abdominal apodeme. Anterior abdominal apodeme with variable median lobes, rounded to angular, contiguous or separate. Lobes smaller in the female anterior apodeme.

Male. Genitalia. **Anal tube.** Incised about half way into pygofer. Rectangular laterally, conical or rectangular in dorsal view (Figs 6J, K, 8E, G, 9F, G).

Pygofer. About as long as wide; fold straight to sublinear basally at about 45°, extended deeply into pygofer; anterior apodeme narrow. Process either at apex of pygofer lobe (Fig. 6K), or process at base of pygofer or subbasally on pygofer (Figs 8F, 9G, I, respectively).

Pygofer lobe. Pygofer lobe distinguished posteriad of point of articulation of anal tube and pygofer. Shape rounded or acute, with dorsal or ventral margins rounded or straight. Desclerotized, lobe-like process either absent (Fig. 7A–K), or mediad of pygofer process (Fig. 8H) or obscured mediad of desclerotized lobe apex (Fig. 9I); sclerotized pygofer process variable in shape, origin and orientation as follows:

1. Process apical, compressed, variably serrate or denticulate, posterior margin concave or straight, symmetrical or asymmetrical (Figs 6K, 7A–K), sometimes damaged (Fig. 7A, E, K).

2. Process ventro-basal, in lateral view concave, orientation dorsoposteriad, acuminate, tubular (Fig. 8F, G).

3. Process subapically on ventral margin directed posteriad, acuminate, sublinear, tubular (Fig. 9G, I).

Subgenital plate. Right-angled elongate triangular, 2.9–3.7 times longer than width at confluence of valve and subgenital plates. Macrosetae uniseriate, marginal (at apex) to submarginal (at base), 7–15, variable in number between left and right sub-

Figure 2. Dorsal habitus of *Retevolatus subspiniverpus* gen. nov. & sp. nov. specimens from selected localities and similar looking species of Deltocephalinae **A–C** *R. subspiniverpus*: **A** Nuwerus, male, unmarked tegmina **B** Nuwerus, male, marked tegmina **C** Nuwerus, female **D–E** undetermined and unplaced genus and species: **D** Biesiesfontein, male **E** Anenous Pass, female **F–J** Deltocephalinae: **F** Kaapsehoop, female, *Dagama* sp. **G** Kaapsehoop, male, *Dagama* sp. **H** Renosterpoort, female, indet. Selenocephalini **I** Buzzard Mountain, female, indet. Selenocephalini **J** New Agatha, male, indet. Selenocephalini. Scale bars: 1 mm (**A–L**).

genital plate (Figs 6H, 8I, 9H). In lateral view apical third curved (Fig. 9G) or angled dorsad (Fig. 8G) or apex very short, angled dorsoposteriad (Fig. 6K).

Valve. Posterior margins straight, acute (Fig. 6H) or obtuse (Figs 8I, 9H); lateral margins sublinear, acute; anterior margins sinuous.

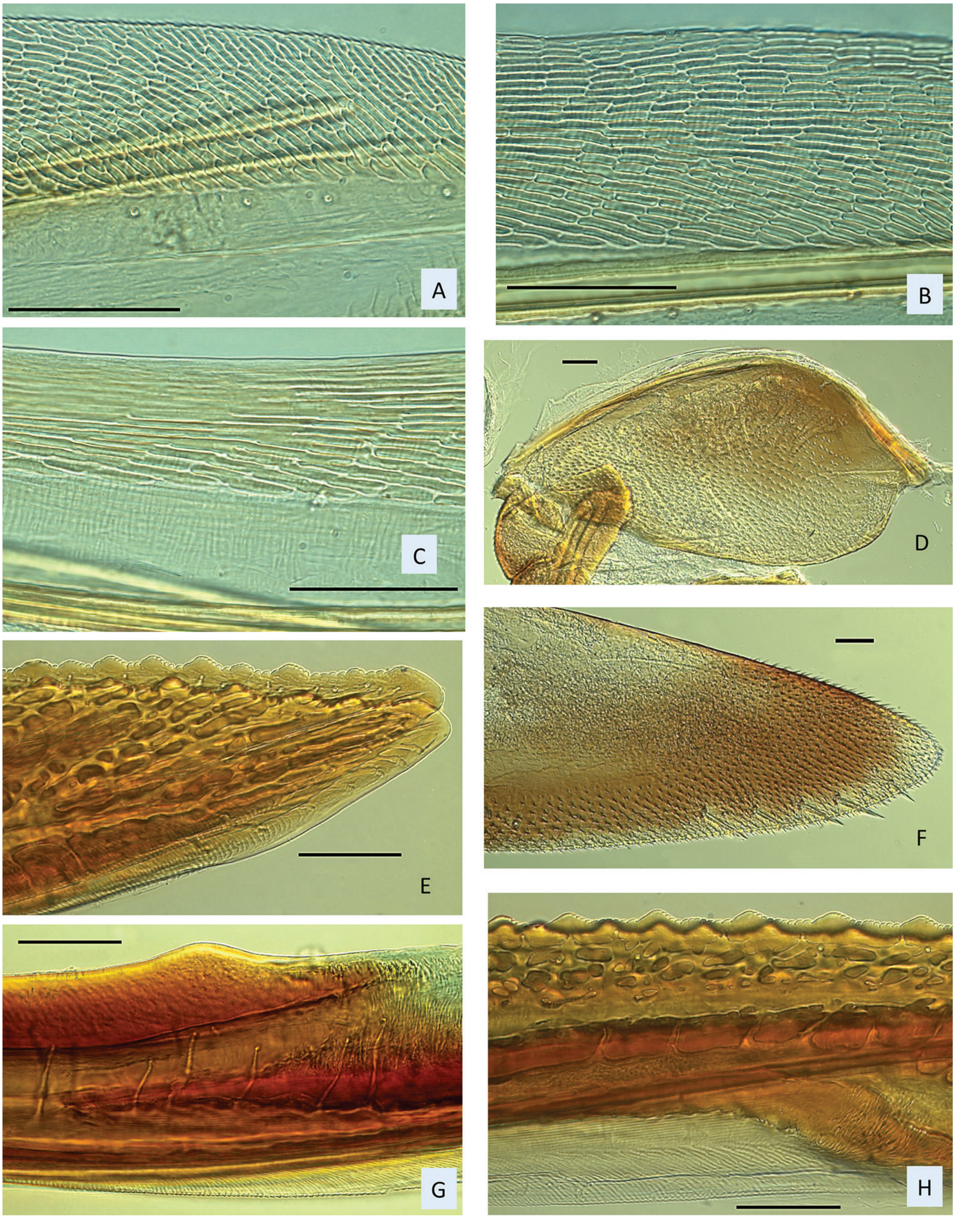

Figure 3. *Retevolatus flexiverpus* gen. nov. & sp. nov. detail of ovipositor **A** valvula 2, subapex, Citrusdal **B** valvula 2, midsection, Citrusdal **C** valvula 3, base, Citrusdal **D** valvifer 1, Citrusdal **E** valvula 2, apex, Piketberg **F** valvula 3, apex, Citrusdal **G** valvula 2, subbase, Piketberg **H** valvula 2, midsection serration, Piketberg. Scale bars: 0.05 mm (**A–H**).

Aedeagus. Dorsal apodeme short (up to one third of shaft); preatrium if present very short; shaft narrowly (Figs 6A–C, 9A) or widely concavely curvate (Fig. 8A); shaft either with apex with right-angled, single, orientation anteriad, (Fig. 6A–C) or acutely angled (Fig. 8A), long or short process, or subapex with single, anteriad process (Fig. 9A); gonopore either on posterior margin of shaft (Fig. 6A–C, 6K), subapically, basad of recurved process, oblique (Fig. 6A–C, E, F anterior, Fig. 8A, B, ventral), or incised at apex (Fig. 9A, B).

Style. Elongate, with elongate apophysis; length to width ratio 3.1–3.7 (ratio length from apex of apophysis to apex of medial arm (sagittal plane) to greatest width across base). Width across preapical lobe slightly wider than width at base of apophysis (Figs 6I, 8D, 9E).

Connective. Y-shaped, with narrow, Y-shaped sclerotized frame with arms and stem equidistant, desclerotized region at base of arms, arms narrow (Figs 6G, 8C, 9C), straight in lateral view (Fig. 9D).

Female. Genital capsule. **Sternite 7.** Transversely rectangular (0.6–0.8 times longer than wide), with deep (depth 0.5–0.6 times greatest length of sternite 7) (Fig. 6M, N) or shallow (depth 0.4–0.5 times greatest length of sternite 7) V-shaped excavation (Figs 6L, 9J). Excavation in *R. semicurviverpus* sp.nov. semi-circular (Fig. 8J).

Valvifer 1. Broadly rounded dorsal and ventral margins, anterior margin obtuse or rounded, posterior margin acute, sometimes angled medioposteriad, commonly posteriad; longer than wide or as long as wide (Figs 3D, 4A, B, F, 5B, 6O–R, 8K, L, 9K, L). Dorsal margin narrowly right-angled mediad. Valvifers joined membranously at anterodorsal margin.

Valvula 1. Curvate, lanceolate (Figs 4D, 5A). Sculpture strigate (Figs 3A–C, 5C, D).

Valvifer 2. As in Fig. 4J.

Valvula 2. Apical third serrate (Figs 4E, 5E), with fine teeth in trough (Figs 3E, H, 4G, H, 5G), short protrusion dorsomedially (Figs 3G, 5E).

Valvula 3. Shape in all species as in Fig. 4K; single row of macrosetae submarginally near apex (Figs 3F, 4C, I, 5F), commonly 4–5, rarely three or six.

Etymology. Named for the net-like color pattern of the tegmina, in Latin, and verb in apposition. Net, *rete*, and flying, *volatus*, for functional wings. Gender masculine.

Discussion. This new genus is recognized by its color pattern, size and configuration of the male and female genitalia. The genus is tentatively placed in Bonaspeiini as it does not share all the features of the tribe. Similar color patterns to that of the new genus are found in the following genera of other tribes: *Libengaia* Linnavuori, 1969 (Opsiini), *Dagama* Distant (Fig. 2F, G), *Allophleps* Bergroth, 1910 (see Webb and Viraktamath 2017), *Houtbayana decemnotata* Linnavuori (Athysanini), an unknown and unplaced genus and species with elongate crown (Fig. 2D, E), undetermined Selenocephalini (Fig. 2H–J) and even in some *Discolopeus* Stiller, 2019 species (Bonaspeiini) have a resemblance in marking at the apex of the crown. One male specimen of an unknown species of the new genus was examined, which suggests additional species of the genus are still to be found and described. This specimen has widely curvate style apophysis, oriented mediad, connective similar to that of *R. semicurviverpus* sp.nov. and *R. subspiniverpus* sp.nov., and the aedeagus very short, thickened, basal paired process and lateral denticulation. Externally the specimen resembles the three new species of *Retevolatus* described here.

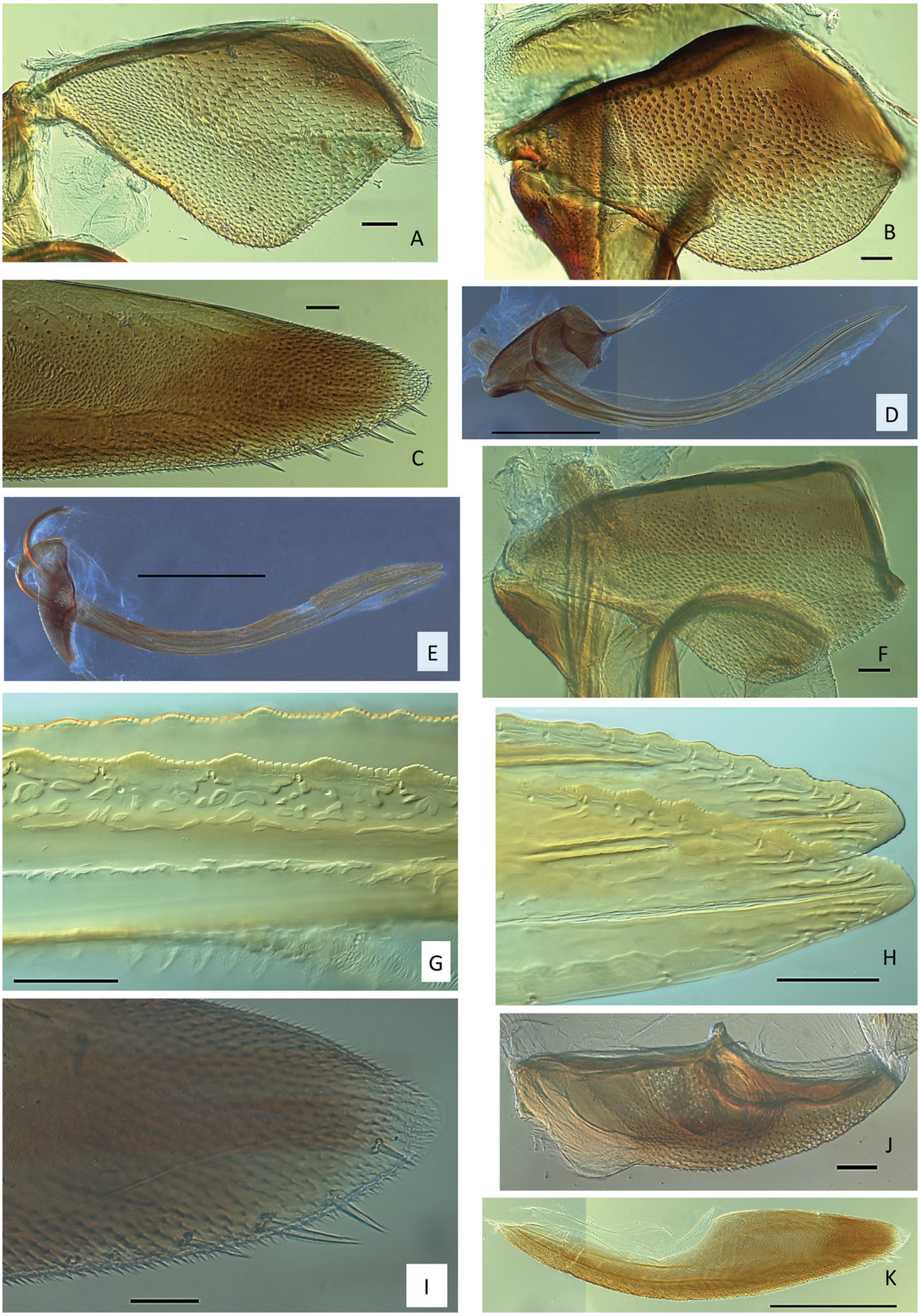

Figure 4. *Retevolatus* gen. nov. & sp. nov. detail of ovipositor **A–C** *R. flexiverpus* sp. nov. **A** valvifer 1, specimen #92, Garies **B** valvifer 1, specimen #99, Garies **C** valvula 3, apex, Garies **D–K** *R. semicurviverpus* sp. nov. detail of ovipositor, specimens from Biesiesfontein **D** valvula 1 **E** valvula 2 **F** valvifer 1 **G** valvula 2, midsection serration **H** valvula 2, apex, serration **I** valvula 3, apex **J** valvifer 2 **K** valvifer 3. Scale bars: 0.05 mm (**A–C**, **F–J**); 0.5 mm (**D–E**, **K**).

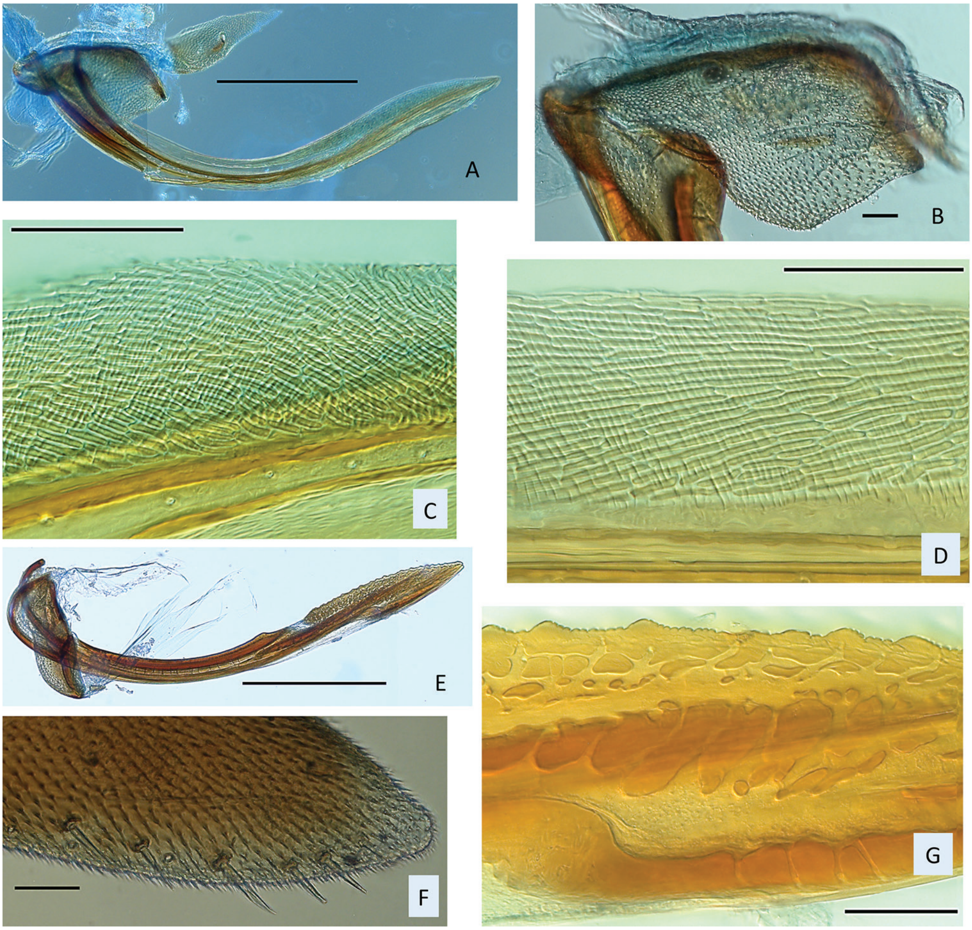

Figure 5. *Retevolatus subspiniverpus* gen. nov. & sp. nov. ovipositor, specimen from Nuwerus **A** valvula 1 **B** valvifer 1 **C** valvula 1, sculpture, subapex **D** valvula 1, sculpture, midsection **E** valvula 2 **F** valvula 3, apex **G** valvula 2, sculpture, midsection. Scale bars: 0.5 mm (**A**, **E**); 0.05 mm (**B–D**, **F**, **G**).

Key to *Retevolatus* gen. nov. males.

1 Male with pygofer with apical, short, transverse process, process variable with long or short serrations or teeth, rectangular or square (Figs 6K, 7A–K); aedeagus strongly curvate, apex with process, broken in some specimens, variable in length (Fig. 6B–D); style apophysis straight (Fig. 6I)........................ .... ***R. flexiverpus* sp. nov.**

1\` Male with pygofer with basal (Fig. 8G) or subapical (Fig. 9G) tubular, acuminate process; aedeagus variably curvate, process apical (Fig. 8A) or subapical (Fig. 9A), broken in some specimens, style apophysis curvate (Fig. 8D) or straight (Fig. 9E).. **2**

2 Male with pygofer with process origin basal (Fig. 8F, G); aedeagus with apical process (Fig. 8A), broken in some specimens, aedeagus weakly curvate (Fig. 8A); style apophysis apex curved laterad (Fig. 8D) ....***R. semicurviverpus* sp. nov.**

2` Male pygofer with process origin subapical (Fig. 9G, I); aedeagus in lateral view strongly curvate, process subapical, broken in some specimens (Fig. 9A); style with apex straight (Fig. 9E) ....***R. subspiniverpus* sp. nov.**

***Retevolatus flexiverpus* sp. nov.**
http://zoobank.org/F9B77C2F-40F0-4B7E-B406-B012296C6128
Figures 1A–I, 3A–H, 4A–C, 6A–R, 7A–M

Material examined. Type locality: Republic of South Africa, Western Cape Province, Piketberg, -32.90, 18.75, 26 Oct. 1971, J.G. Theron leg.

Type specimen. Holotype male, pinned, with genitalia in a separate microvial. Original label: "South Africa, Piketberg 26-10-71, J.G. Theron" "SANC Pretoria Dbase CCDL27850 (blue paper)".

Paratypes. 57♂♂, 48♀♀

South Africa • 1♂; Western Cape Province, between Citrusdal and Clanwilliam, Olifants River; -32.36, 18.95; 15 Oct.1931; SANC Pretoria Dbase CCDL27849.

South Africa • 16♂♂, 4♀♀; ibid. holotype. BMNH, INHS.

South Africa • 6♂♂, 5♀♀; Western Cape Province, Citrusdal; -32.6, 19.05; 9 Nov. 1971; F. Honibal leg.; SANC Pretoria Dbase CCDL27847.

South Africa • 1♀; Western Cape Province, Agter Witsenberg, Slagboom farm; -33.23, 19.26; 6 Jan. 1973; J.G. Theron leg.; SANC Pretoria Dbase CCDL27842.

South Africa • 2♂♂, 2♀♀; Western Cape Province, Citrusdal; -32.6, 19.05; 5 Nov. 1973; F. Honibal leg.; SANC Pretoria Dbase CCDL27848.

South Africa • 3♂♂, 1♀; Western Cape Province, Gouda; -33.31, 19.03; 30 Oct. 1974; J.G. Theron leg.; SANC Pretoria Dbase CCDL27845.

South Africa • 3♂♂; Western Cape Province, Hermon; -33.43, 18.96; 30 Oct. 1974; J.G. Theron leg.; SANC Pretoria Dbase CCDL27846.

South Africa • 9♂♂, 7♀♀; Western Cape Province, Klipheuwel; -33.56, 18.7; 24 Nov. 1974; J.G. Theron leg.; *Maytenus heterophylla*, Celastraceae; SANC Pretoria Dbase CCDL27853. BMNH, INHS.

South Africa • 1♂, 11♀♀; Western Cape Province, Garies Kamiesberg; -30.46, 18.13; 15 Oct. 1976; J.G. Theron leg.; SANC Pretoria Dbase CCDL27854.

South Africa • 7♂♂, 6♀♀; Western Cape Province, Clanwilliam Cedarberg; -32.5, 19.25; 21 Dec. 1976; J.G. Theron leg.; SANC Pretoria Dbase CCDL27844. BMNH, INHS.

South Africa • 2♂♂, 2♀♀; Western Cape Province, Darling; -33.37, 18.38; 18 Dec. 1981; J.G. Theron leg.; SANC Pretoria Dbase CCDL27843.

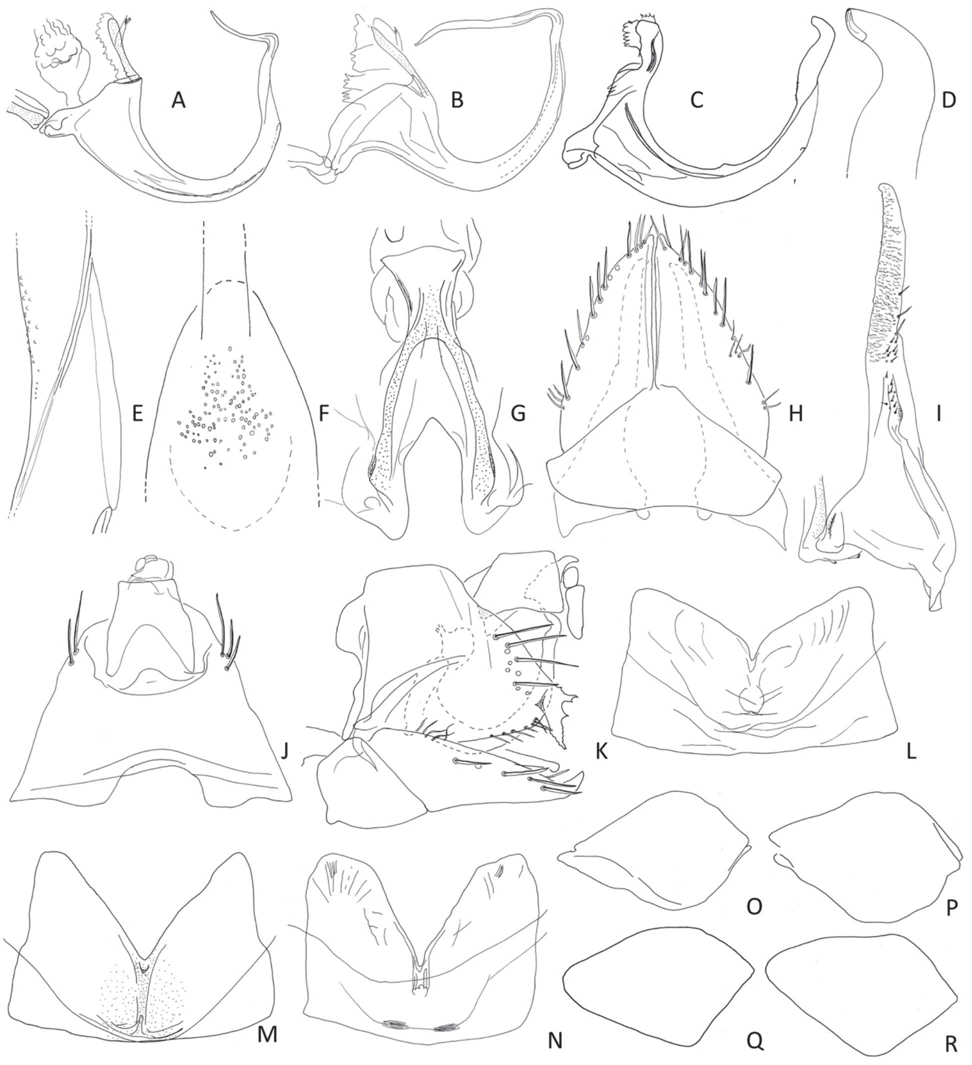

Figure 6. *Retevolatus flexiverpus* gen. nov. & sp. nov. male genitalia and female ovipositor **A** aedeagus, lateral, Brakwater **B** aedeagus, lateral, Garies **C** aedeagus, lateral, Ceres **D** aedeagus, apex, Ceres **E** aedeagus, gonopore, lateral, Ceres **F** aedeagus, gonopore, anterior, Ceres **G** connective **H** style **I** subgenital plate **J** pygofer, Clanwilliam **K** pygofer, Clanwilliam **L** sternite 7, Garies **M** sternite 7, Piketberg **N** sternite 7, Garies **O** valvifer 1, left, Garies, specimen #99 **P** valvifer 1, right, Garies, specimen #99 **Q** valvifer 1, left Garies, specimen #92 **R** valvifer 1, right, Garies, specimen #92.

South Africa • 2♀♀; Western Cape Province, Wiedouw farm base of Gifberg Pass; -31.733, 18.766; 3 Oct. 2002; M. Stiller leg.; *Salvia lanceolata*, Lamiaceae; SANC Pretoria Dbase CCDL18349.

South Africa • 1♂; Western Cape Province, Wiedouw farm base of Gifberg Pass; -31.733, 18.766; 3 Oct. 2002; M. Stiller leg.; *Diosma hirsuta*, Rutaceae; SANC Pretoria Dbase CCDL18350.

South Africa • 1♀; Western Cape Province, Wiedouw farm base of Gifberg Pass; -31.733, 18.766; 3 Oct. 2002; M. Stiller leg.; *Phylica oleifolia*, Rhamnaceae; SANC Pretoria Dbase CCDL18351.

South Africa • 1♂; Western Cape Province, Wiedouw farm base of Gifberg Pass; -31.733, 18.766; 3 Oct. 2002; M. Stiller leg.; sweeping trees and shrubs at night, *Passerina truncata* subsp. *truncata*, Thymelaeaceae; SANC Pretoria Dbase CCDL18352.

South Africa • 5♂♂, 6♀♀; Northern Cape Province, Oorlogskloof, Brakwater; -31.465, 19.079; 17 Dec. 2016; M. Stiller leg.; *Diospyros austro-africana*, Rhamnaceae; SANC Pretoria Dbase CCDL27851. BMNH, INHS.

Diagnosis. Male aedeagus with shaft narrowly curvate, C-shaped, at apex with single, right-angled anteriad, sclerotized process (Fig. 6A–C); gonopore posteriad, basad of apogee; anteriad surface opposite gonopore minutely denticulate (Fig. 6E, F). Style apophysis straight (Fig. 6I). Connective short, ratio length to width 2.2–2.7, stem length to arm length 1.1–1.6 (Fig. 6G). Pygofer process apical, transversely rectangular or square with variable denticulation and serration (Figs 6K, 7A–K). Female sternite 7 with V-shaped notch (Fig. 6L–N).

Male. Measurements. n=58. Length from apex of crown to apex of tegmina 5.15–5.67 mm. Length from apex of crown to apex of abdomen 3.78–4.26 mm. Crown median length 0.39–0.43 mm. Crown length next to eye 0.30–0.34 mm. Pronotum length 0.58–0.63 mm. Head width across eyes 1.35–1.46 mm. Pronotum width 1.25–1.36 mm. Ocellus diameter 47.0–61.6 µm; interocular distance 82.7–100.5 µm. Crown angle 117.4–122.3°.

Genitalia. Pygofer lobe. Macrosetae dorsomedially (Fig. 6K). Margins rounded or straight. Apex with compressed, sclerotized process; transversely or longitudinally rectangular, process with large or small teeth or denticles, symmetrical or asymmetrical, orientation mediad or posteriad (Figs 6K, 7A–K). Pygofer lobe without desclerotized median lobe, rounded lobe ventrad of process (Fig. 7A, D, E, G, H, I, J).

Subgenital plate. Length to width 1.5–1.8 times longer than width at confluence of subgenital plate and valve. Macrosetae varying by 1–3 macrosetae between left and right side, 5–12 macrosetae (Fig. 6H). Apex of style near apex of subgenital plate (Fig. 6H).

Aedeagus. Dorsal apodeme digitate, reflexed anteriad (Fig. 6A, B) or dorsad (Fig. 6C); preatrium short (Fig. 6A–C); apex of shaft reflexed anteriad, right-angled, slightly sinuous or sublinear, variable in length and shape (Fig. 6A, B), variable in length, commonly 0.1–0.2 times as long as vector length of shaft from apex of apogee to apex of preatrium. One specimen from Garies with very long reflexed process (Fig. 6B), 0.5 times as long as vector length of shaft from apex of apogee to apex of preatrium; apex broken in other specimens, i.e. all males from Ceres (Fig. 6C, D) and Darling. Shaft narrowly curvate, angle subtended by arc 91.1–146.2°, anterior margin below apogee with fine denticulation (Fig. 6E, F).

Connective. Short, ratio of length to width 2.2–2.7; stem length to arm length 1.1–1.6 (Fig. 6G).

Style. Apophysis straight (Fig. 6I), length of apophysis 0.4 times greatest length through sagittal plane; apex of apophysis attaining apex of subgenital plate (Fig. 6H).

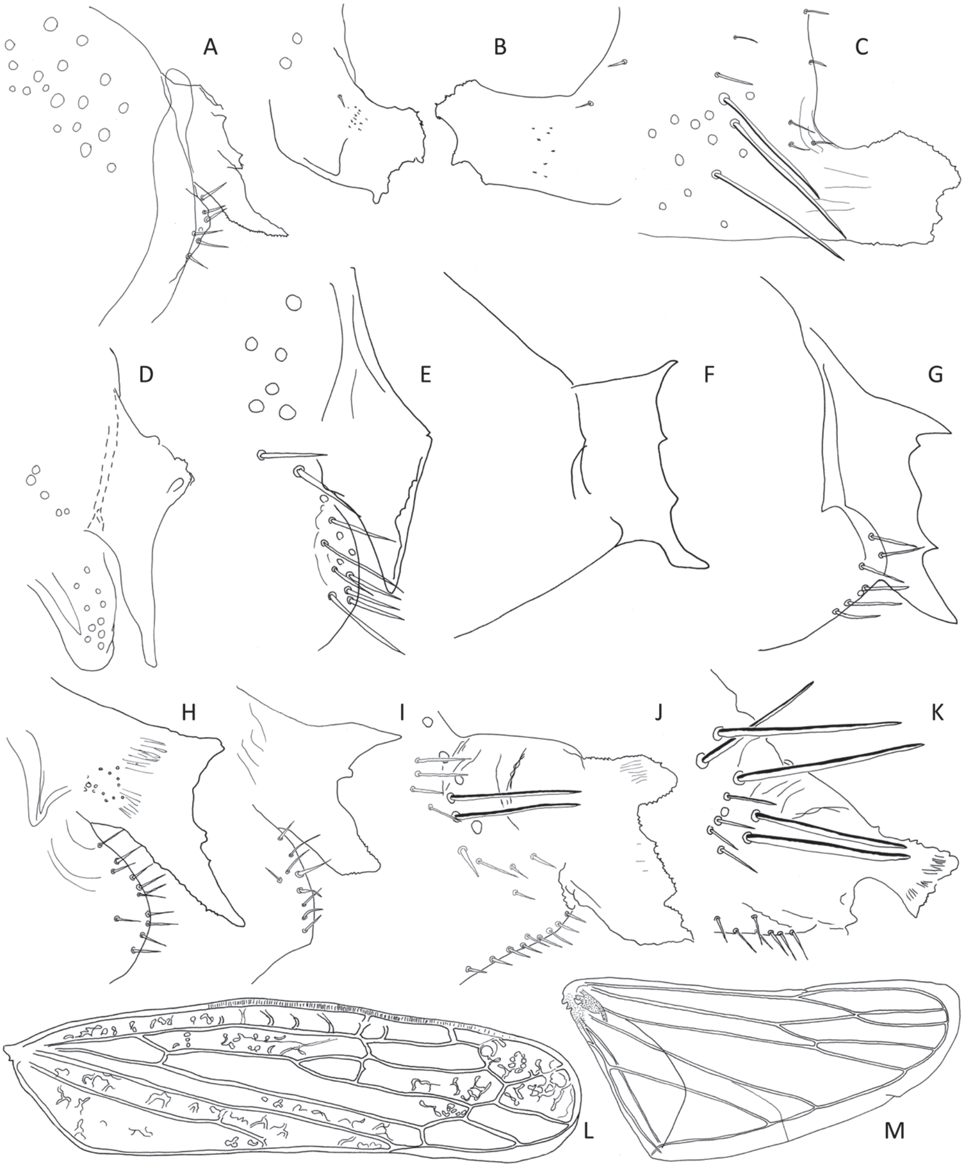

Figure 7. *Retevolatus flexiverpus* gen. nov. & sp. nov. male pygofer lobe, shape of process and wings **A** Darling, lateral **B** Brakwater, caudal **C** Wiedouw, lateral **D** Ceres, lateral **E** Ceres, lateral **F** Piketberg, lateral **G** Hermon, lateral **H** Klipheuwel, lateral **I** Klipheuwel, lateral **J** Garies, lobe 1, lateral **K** Garies, lobe 2, lateral **L** tegmina, Brakwater, male **M** hind wing, Brakwater, male.

Female. Measurements. n=50. Length from apex of crown to apex of tegmina 5.60–6.23 mm. Length from apex of crown to apex of abdomen 4.48–4.94 mm. Crown median length 0.41–0.47 mm. Crown length next to eye 0.33–0.36 mm. Pronotum length 0.62–0.68 mm. Head width across eyes 1.45–1.58 mm. Pronotum width 1.35–1.49 mm. Ocellus diameter 53.4–62.8 µm; interocular distance 89.0–109.3 µm. Crown angle 115.5–123.2°.

Genital capsule. Sternite 7. V-shaped notch, relative depth of notch 0.49–0.60 times greatest length of sternite 7; ratio of length to width 0.65–0.81. Posterolateral margins truncate in Oorlogskloof and Garies (Fig. 6N) specimens, narrowly rounded in Citrusdal, Clanwilliam, Garies (Fig. 6L) and Piketberg (Fig. 6M).

Valvifer 1. Variable in roundness of margins, dorsal and ventral margins broadly rounded, anterior and posterior margins narrowly rounded (Figs 3D, 4A, B, 6O–R). Ratio of length to width 1.47–1.84.

Valvula 1. Sculpture strigate (Fig. 3A–C), angulate at apex and subapex (Fig. 3A) and parallel to dorsal margin from subapex to base (Fig. 3B, C).

Valvifer 2. Similar to valvifer 2 in Figs 4J, attached to valvula 2, detail as in Figs 4E, 5E.

Valvula 2. Whole part as in Fig. 4E, serration in Fig. 3E, H, short tooth in Fig. 3G.

Valvula 3. Shape as in Fig. 4K. Macrosetae 37.4–79.2 µm (Figs 3F, 4C).

Etymology. Named for the sharp bend in the aedeagal shaft, in Latin. Bend, *flexus*, and aedeagus, *verpa*. Gender masculine.

Distribution. Brakwater, Ceres, Citrusdal, Clanwilliam, Darling, Klipheuwel, Garies, Gouda, Hermon, Piketberg, Wiedouw, Fig. 18A, red squares.

Discussion. The aedeagus of this species is strongly curved, with a right-angled anteriad apical process, that is variable in length, and broken in a number of examined specimens, specifically from Ceres and Darling. The length in most specimens depicted in Fig. 6A, with the longest found in one specimen from Garies, Fig. 6B. In this male from Garies the subgenital plate, pygofer process (Fig. 7J, K), connective and style resemble those of the other specimens in this species. The pygofer process is apical, variable in shape and orientation, and damaged in some specimens. Plant distribution records for *Salvia lanceolata* in Fig. 18C.

Retevolatus semicurviverpus sp. nov.

http://zoobank.org/E81353AE-6A7E-4226-8008-81BD9A46517A
Figures 4D–K, 8A–L

Material examined. Type locality: Republic of South Africa, Northern Cape Province, South of Springbok, Biesiesfontein farm; -29.75, 17.933; 29 Sep.–3 Oct. 2002; M. Stiller leg.; sweep *Searsia undulata*, Anacardiaceae.

Type specimen. Holotype male, pinned, with genitalia in a separate microvial. Original label: “R.S.A., Biesiesfontein farm, Springbok, -29.75, 17.933; 29.ix.–3.x.2002, M. Stiller” “sweep *Rhus* [now *Searsia*] *undulata*, Anacardiaceae” “SANC Pretoria Dbase CCDL18346 (blue paper)”.

Paratypes. 12♂♂, 10♀♀

South Africa • 11♂♂, 10♀♀; ibid. holotype. SANC, BMNH, INHS.

South Africa • 1♂; ibid. holotype; 29 Sep. 2002; M. Stiller leg.; light trap; SANC Pretoria Dbase CCDL18346.

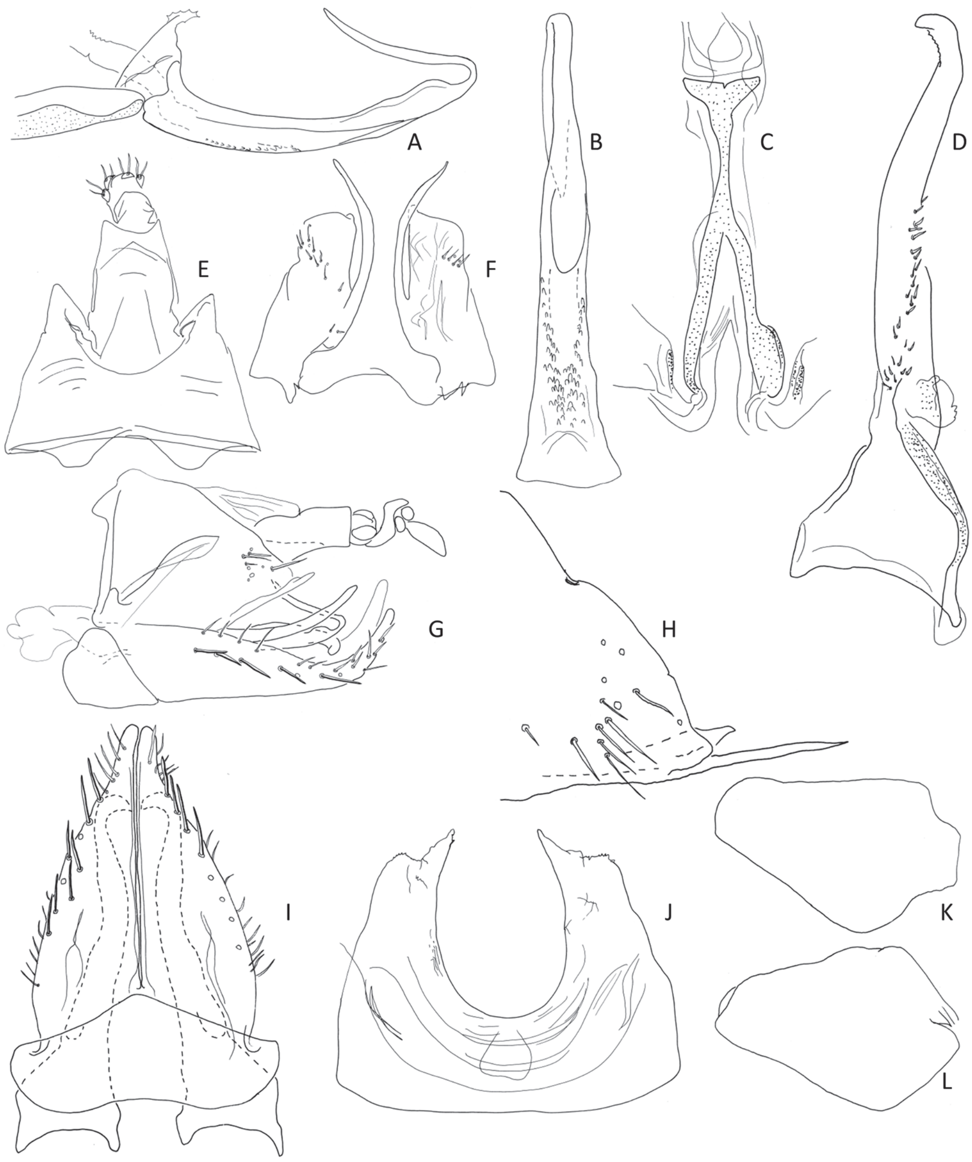

Figure 8. *Retevolatus semicurviverpus* gen. nov. & sp. nov. male genitalia and female ovipositor **A** aedeagus, lateral **B** aedeagus, ventral **C** connective **D** style **E** pygofer, dorsal **F** pygofer, ventral **G** pygofer, lateral **H** pygofer lobe, lateral **I** subgenital plate **J** sternite 7 **K** valvifer 1, left **L** valvifer 1, right.

Diagnosis. Male aedeagus with shaft widely curvate, C-shaped, at apex with single, acutely-angled anteriad, sclerotized process; gonopore ventromediad; shaft ventrobasally to ventromedially coarsely denticulate (Fig. 8A, B). Style apophysis with apex narrowly curvate mediad (Fig. 8D). Connective elongate (Fig. 8C), ratio length to width 3.2–3.5, stem length to arm length 2.2–2.6. Pygofer process ventral, tubular, concavely curvate in lateral view, lateroposteriad in ventral view (Fig. 8F, G). Female sternite 7 with deep, semi-circular notch (Fig. 8J).

Male. Measurements. n=22. Length from apex of crown to apex of tegmina 5.69–5.98 mm. Length from apex of crown to apex of abdomen 4.24–4.64 mm. Crown median length 0.42–0.45 mm. Crown length next to eye 0.31–0.34 mm. Pronotum length 0.59–0.63 mm. Head width across eyes 1.45–1.51 mm. Pronotum width 1.35–1.41 mm. Ocellus diameter 47.0–58.7 µm; interocular distance 99.2–118.4µm. Crown angle 116.5–121.3°.

Genitalia. Pygofer lobe. Macrosetae absent, fine setae sparsely on lobe (Fig. 8H). Process origin ventrally on pygofer, concavely curvate, acuminate, tubular, moderately sclerotized (Fig. 8F). Pygofer lobe desclerotized, triangular; ventromedially with membranous lobe, variable in orientation and projection beyond pygofer lobe (Fig. 8H).

Subgenital plate. Length to width 2.2–2.4 times longer than width at confluence of subgenital plate and valve. Macrosetae 5–10, variable between left and right plate (Fig. 8I). Apex of style near apex of subgenital plate (Fig. 8I).

Aedeagus. Dorsal apodeme narrow, desclerotized; preatrium reduced (Fig. 8A); apex of shaft reflexed anteriad, long, about 0.4–0.5 times as long as vector length of shaft from apex of apogee to base of shaft (Fig. 8A, B). Shaft widely curvate, angle subtended by arc 53.4–68.1°, coarse denticulation ventrally, in basal half.

Connective. Elongate, ratio of length to width 3.2–3.5; stem length to arm length 2.2–2.6 (Fig. 8C).

Style. Apophysis apex curved mediad; length of apophysis 0.4 times greatest length through sagittal plane (Fig. 8D).

Female. Measurements. n=15. Length from apex of crown to apex of tegmina 5.91–6.12 mm. Length from apex of crown to apex of abdomen 4.37–4.87 mm. Crown median length 0.44–0.47 mm. Crown length next to eye 0.33–0.35 mm. Pronotum length 0.61–0.64 mm. Head width across eyes 1.51–1.57 mm. Pronotum width 1.41–1.47 mm. Ocellus diameter 53.6–61.2 µm; interocular distance 100.3–113.1 µm. Crown angle by trigonometry 116.9–120.1°.

Genital capsule. Sternite 7. Semi-circular notch, posterior margins straight or slightly concave, fine irregular, asymmetrical denticles marginally (Fig. 8J). Relative depth of notch 0.65–0.68 times greatest length of sternite 7; ratio of length to width 0.74–0.83.

Valvifer 1. Dorsal margin sublinear, ventrobasal margin sublinear, ventrodistal margin rounded, posterior margin obtuse (Fig. 8L) or truncated (Figs 4F, 8K). Ratio of length to width 1.51–1.87.

Valvula 1. Shape in Fig. 4D.

Valvifer 2. Shape in Fig. 4J.

Valvifer 2. Shape in Fig. 4E.

Valvula 3. Shape as in Fig. 4K. Macrosetae variable in number (Fig. 4I), length 35.8–55.2 µm.

Etymology. Named for the weak curve in the aedeagal shaft, in Latin. Half, *semi*, curved, *curvus*, and aedeagus, *verpa*. Gender masculine.

Distribution. Biesiesfontein, Fig. 18A, green circle.

Discussion. The aedeagus of this species is weakly curved, with an acutely angled dorsoanteriad, apical process that is constant in length, and whole in all examined specimens. The pygofer process is uniform in examined specimens, originating ventrally on the pygofer, acuminate and directed dorsoposteriad. The apophysis of the style of this species is curved mediad at its apex, and straight in *R. subspiniverpus* and *R. flexiverpus*. The deep, rounded notch of the sternite 7 of this species is distinct from the shallow or deep V-shaped notch of the other two species. The color and shape in dorsal and lateral views of this species resembles that of *R. flexiverpus* in Fig. 1A–I closely.

Retevolatus subspiniverpus **sp. nov.**
http://zoobank.org/7EE5B450-6062-47C8-B763-CFDA3ED93951
Figures 2A–C, 5A–G, 9A–L

Material examined. Type locality: Republic of South Africa, Western Cape Province, Nuwerus; -31.14, 18.35, 10 Nov.1971, J.G. Theron leg.

Type specimen. Holotype male, pinned, with genitalia in a separate microvial. Original label: “South Africa, Nuwerus, 10-11-71, J.G. Theron” “SANC Pretoria Dbase CCDL27852” (blue paper).

Paratypes. 29♂♂, 16♀♀

South Africa • 29♂♂, 16♀♀; ibid holotype. SANC, BMNH, INHS.

Diagnosis. Male aedeagus with shaft strongly curvate, C-shaped, subapex dorsally with single, straight, narrow, right-angled anterodorsad, sclerotized process; gonopore apical, incised between lateral margins; shaft with lateral margins coarsely denticulate (Fig. 9A, B). Style apophysis straight (Fig. 9E). Connective elongate (Fig. 9C), ratio of length to width 3.4–3.7; stem length to arm length 2.1–2.3. Pygofer process present basally on pygofer lobe, sublinear, acuminate, tubular, moderately sclerotized, orientation dorsoposteriad (Fig. 9F, G, I). Female sternite 7 with wide, shallow V-shaped notch, sternite distally narrower than base (Fig. 9J).

Male. Measurements. n=28. Length from apex of crown to apex of tegmina 4.51–4.75 mm. Length from apex of crown to apex of abdomen 3.29–3.61 mm. Crown median length 0.34–0.36 mm. Crown length next to eye 0.28–0.30 mm. Pronotum length 0.52–0.55 mm. Head width across eyes 1.24–1.30 mm. Pronotum width 1.16–1.22 mm. Ocellus diameter 39.3–50.7 µm; interocular distance 75.0–89.0 µm. Crown angle 120.6–124.1°.

Genitalia. Pygofer lobe. Macrosetae absent, fine setae sparsely on lobe (Fig. 9G, I). Process origin is subapically on ventral margin of pygofer lobe, sublinear, acuminate, tubular, moderately sclerotized, orientation dorsoposteriad. Pygofer lobe desclerotized, acutely angled triangle, desclerotized lobe obscure, mediad of lobe (Fig. 9I).

Subgenital plate. Length to width 2.0–2.2 times longer than width at confluence of subgenital plate and valve. Macrosetae 9–15, variable between left and right plate. Apex of style extended half way into subgenital plate (Fig. 9H).

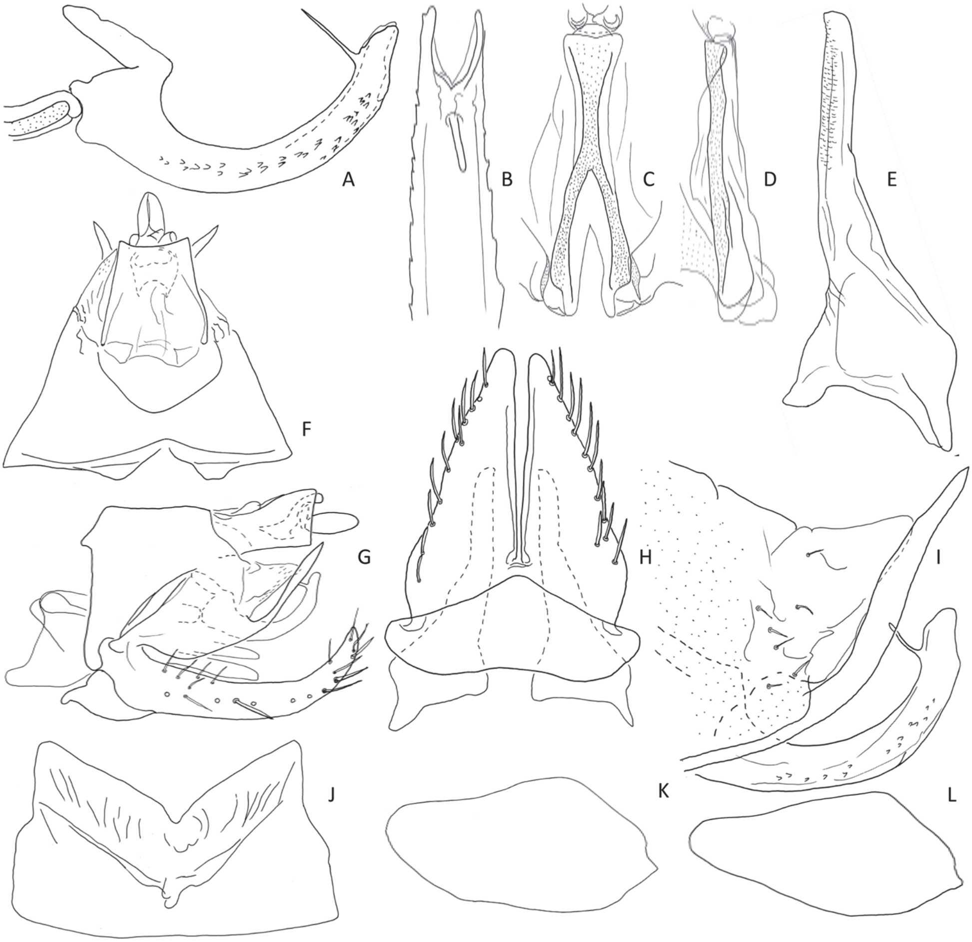

Figure 9. *Retevolatus subspiniverpus* gen. nov. & sp. nov. male genitalia and female ovipositor **A** aedeagus, lateral **B** aedeagus, apex, anterior **C** connective, dorsal **D** connective, lateral **E** style **F** pygofer, dorsal **G** pygofer, lateral **H** subgenital plate **I** pygofer lobe, lateral **J** sternite 7 **K** valvifer 1, left **L** valvifer 1, right.

Aedeagus. Dorsal apodeme digitate, reflexed anteriad; preatrium absent; subapex dorsally with straight, right-angled, elongate, anterodorsad process (process sometimes broken, see Discussion below) (Fig. 9A, B). Shaft narrowly curvate, angle subtended by arc 87.1–134.3°, incised apically along dorsal and ventral margins bordering gonopore; laterally with coarse denticulation.

Connective. Elongate, ratio length to width 3.4–3.7; stem length to arm length 2.1–2.3 (Fig. 9C).

Style. Apophysis straight (Fig. 9E), length of apophysis 0.3–0.4 times greatest length through sagittal plane.

Female. Measurements. n=15. Length from apex of crown to apex of tegmina 4.97–5.23 mm. Length from apex of crown to apex of abdomen 3.96–4.14 mm.

Crown median length 0.38–0.41 mm. Crown length next to eye 0.31–0.33 mm. Pronotum length 0.57–0.59 mm. Head width across eyes 1.36–1.42 mm. Pronotum width 1.26–1.33 mm. Ocellus diameter 43.2–56.6 μm; interocular distance 89.3–103.9 μm. Crown angle 118.7–122.5°.

Genital capsule. Sternite 7. V-shaped notch (Fig. 9J), relative depth of notch 0.38–0.45 times greatest length of sternite 7; ratio of length to width 0.56–0.65.

Valvifer 1. Dorsal margin widely curvate, ventral margin more strongly curvate; anterior margin rounded, posterior margin acute (Figs 5B, 9K, L). Ratio of length to width 1.85–2.04.

Valvula 1. Shape in Fig. 5A. Detail of sculpture, striate, at subapex (Fig. 5C), midsection (Fig. 5D).

Valvifer 2. Similar to valvifer 2 in Figs 4J.

Valvula 2. Shape in Fig. 5E. Detail of serration and sculpture at subapex in Fig. 5G.

Valvula 3. Macrosetae 4–5 in number (Fig. 5F), 36.8–66.1 μm.

Etymology. Named for the subapical position of the spine on the aedeagal shaft, in Latin. Under, *subter*, spine, *spinus*, aedeagus, *verpa*. Gender masculine.

Distribution. Nuwerus, Fig. 18A, blue triangle.

Discussion. The aedeagus of this species is strongly curved, with a subapical, right-angled dorsoanteriad process. Both or part of the apex and process of the shaft were damaged randomly in seven of 11 dissected of specimens, i.e. the process was broken at the base in four and broken at the apex in one specimen, and the shaft apex was partially or entirely damaged in two specimens. The pygofer process origin is ventrally and basally on the pygofer lobe, orientation posteriad, tubular and apex acuminate. The sternite 7 of this species (Fig. 9J) has a similar V-shaped, shallow notch to that of *R. flexiverpus* (Fig. 6L), but is narrowed distally, even more than in Fig. 6M. The valvifer 1 is more elongated than in the other species of *Retevolatus*.

***Flavorubivolatus* gen. nov.**

http://zoobank.org/266CA90E-1824-418C-9505-042F9A8559B2

Figures 10–17

Type-species. *Flavorubivolatus glabriverpus* sp. nov., by present designation.

Diagnosis. Macropterous, with tegmina longer than abdomen, hind wing with well-developed jugal lobe (Fig. 15P), 2.6–3.8 mm from apex of crown to apex of tegmina. Color yellow to stramineous (Fig. 10A, E) or reddish orange (Figs 10F–I, 11A–D) head, pronotum and scutellum, tegmina light brown, translucent, costal cells opaque, pale yellow (Fig. 10E, F) or whitish (Fig. 11D). Aedeagus with shaft narrow tubular (Fig. 15A, C) or compressed (Figs 16A–D, 17B–D), either immaculate, curvate, convex, orientation posteroventrad (Fig. 15E), or with shaft with paired long (Fig. 16A–D) or short basal acuminate process (Fig. 17C, D). Subgenital plate triangular, apex narrowly rounded (Fig. 15O), broadly round (Fig. 16J) or truncated

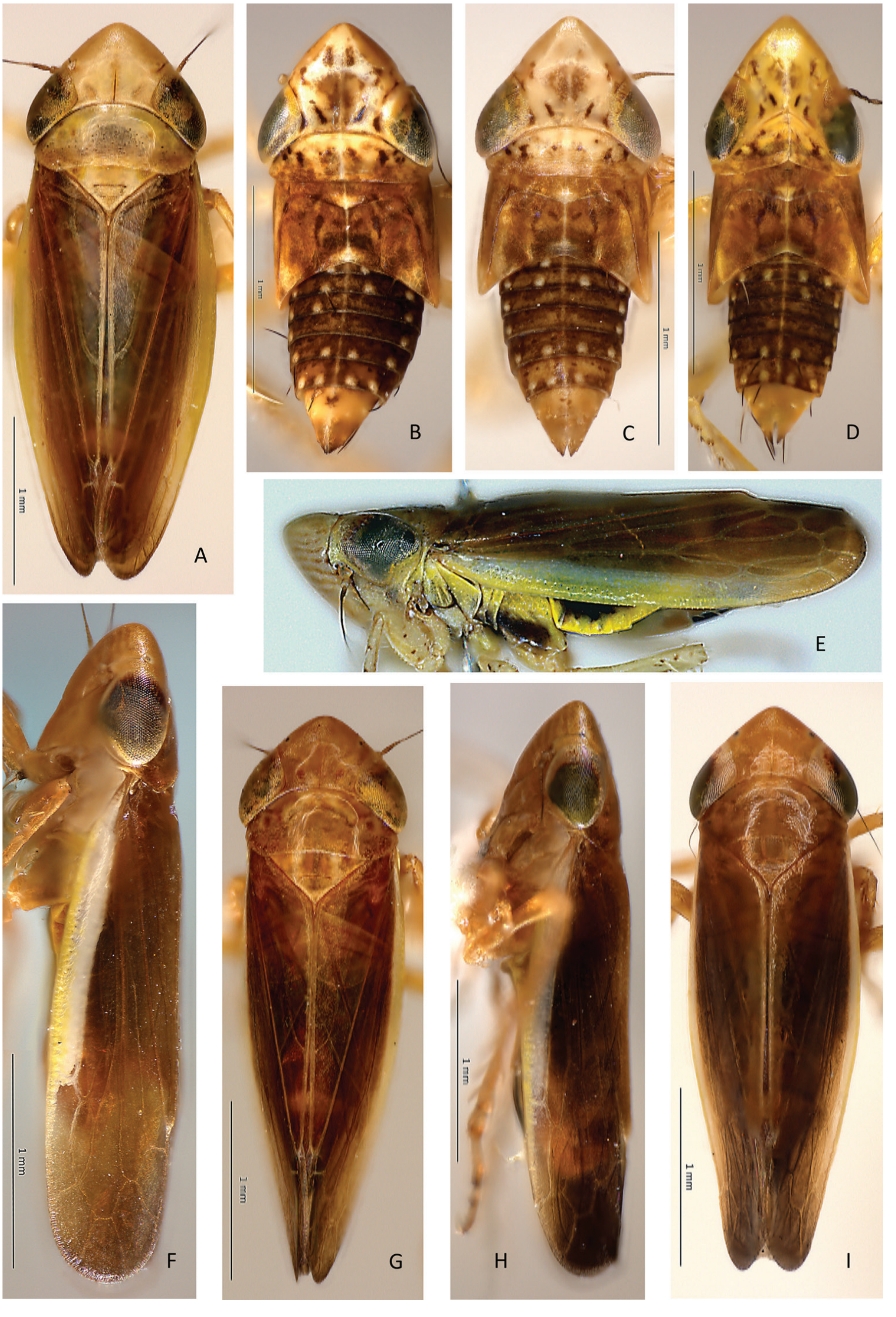

Figure 10. *Flavorubivolatus* gen. nov. Dorsal and lateral habitus view, males, females and nymphs. **A–E** *F. glabriverpus* sp. nov. Dorsal and lateral habitus view, males, females and nymphs **A** Piketberg, male, dorsal **B** Clanwilliam, female, dorsal **C** Driehoek, female, dorsal **D** Sederberge, female, dorsal **E** Driehoek, female, lateral **E–I** *F. tensiverpus* sp. nov. dorsal and lateral habitus view, males, females **F** Cedarberg, female, dorsal **G** Clanwilliam, male, dorsal **H** Clanwilliam, female, lateral **I** Doltuin, female, lateral. Scale bars: 1 mm (**A–D**, **F–I**).

Figure 11. *Flavorubivolatus* gen. nov. and *Renosteria* species habitus **A–D** *F. curtiverpus* sp. nov. Dorsal habitus view, males. **A** Clanwilliam, female, dorsal **B** Clanwilliam, female, dorsal **C** Dwarsrivier, male, dorsal **D** Dwarsrivier, male, dorsal **E–I** *Renosteria* species: **E** *R. overbergia*, male **F** *R. hoekoensis*, male **G** *R. hantamensis*, male, Kamieskroon **H** *R. hantamensis*, female, Nieuwoudtville **I** *R. goudinica*, male. Scale bars: 1 mm (**A–I**).

(Fig. 17H); apex extended beyond margin of pygofer lobe (Figs 15K, 16L, 17G). Pygofer lobe at apex with short (Fig. 15N) or long acuminate sublinear process, oriented posteromediad (Fig. 16H, I, K, N) or apically denticulate and oriented mediad (Fig. 17G, J, K, L).

Male and female. Color. Yellow to stramineous (Fig. 10A, E) or reddish orange head, pronotum and scutellum (Figs 10F–I, 11A–D), tegmina light brown, translucent, costal cells opaque, pale yellow (Fig. 10A, E) or whitish (Fig. 10F, H).

Measurements. All specimens of all species. Length from apex of crown to apex of tegmina 2.58–3.78 mm. Crown median length 0.44–0.54 mm. Crown length next to eye 0.31–0.36 mm. Pronotum length 0.35–0.39 mm. Head width across eyes 0.89–1.12 mm. Pronotum width 0.88–0.97 mm. Ocellus diameter 25.9–35.3 µm; interocular distance 40.3–54.1 µm. Males and females with similar dimensions. Crown angle by trigonometry 85.1–92.8°.

Wings. Tegmina with four apical cells, outer and central anteapical cells (inner anteapical cell and inner discal cells merged) (Fig. 15Q). Hind wing with vannal lobe large, greatest length 0.4 times greatest width of hind wing), four apical cells (Fig. 15P).

Profemur. Anteromedial margin with basal 7–9 AV setae short, spine-like; intercalary setae (n=8–10) disjunct without AV_1 differentiation, subapical AM_1 longer and thicker than any setae in IC.

Metatibia. Hind knee setal formula 2+2+1; apical pair sub equal, shorter than long median seta, median setae with one very long and the other very narrow and about half as long; basal seta longer than median and apical setae.

Metatarsi. Metatarsus 1 apex with five rounded platellae or four rounded and one acute platellum; metatarsus 2 apex with two lateral acute and two medial rounded platellae.

Abdominal apodemes. Anterior abdominal apodeme with desclerotized, rounded or angulate lobes, expanded anteriad and posteriad, not wider than width of apodeme, lobes contiguous in males, separate in females.

Male. Genitalia. **Anal tube.** Rectangular (Fig. 15J) or conical (Figs 16H, 17J), 1.1–1.4 times longer than wide.

Pygofer. In lateral view about as long as wide (Figs 15J, K, 16H, L), or longer than wide (Fig. 17G, J), anal tube incised either superficial (Fig. 15J, K), or about half way (Fig. 16H, L), or about three quarters into pygofer (Fig. 17G, J), anterior basal fold straight to sublinear at about 45°; anterior apodemes narrow.

Pygofer lobe. Pygofer lobe contiguous with pygofer, apex broadly rounded, with desclerotized rounded lobe (Fig. 15J, K, L, N) or more narrowly rounded with wider membranous lobe (Figs 16I, 17G) at apex. Pygofer process either short, acute, curvate (Fig. 15L, N), or sinuous (Fig. 16K, N) or elongate and straight with denticulate apex (Fig. 17J, K, L). Macrosetae elongate, narrow, near dorsoposterior apex of pygofer, 10–20, longest macrosetum about as long as width across subapex (Fig. 15K) or midsection pygofer lobe (Figs 16L, 17G).

Subgenital plate. Lateral margin sinuous, medial margin straight; either acutely triangular, apex narrowly rounded (Fig. 15O), or right-angled elongate triangular with broadly rounded apex (Fig. 16J), or right-angled triangular with truncated apex (Fig. 17H); 1.6–2.2 times longer than width at confluence of valve and subgenital plates. Macrosetae 1–3 irregular rows, marginal to submarginal, across most of lateral margin, 7–15 macrosetae, variable in number between left and right subgenital plate. Apex extended beyond posterior margin of pygofer, orientation medioposteriad (Figs 15K, 16L) or curvate dorsoposteriad (Fig. 17G).

Valve. Broader than long, obtusely triangular (Figs 15O, 16J, 17H).

Aedeagus. Shaft longer than dorsal apodeme and preatrium (when present), either tubular, concavely curvate, glabrous (Fig. 15A, C, E); or compressed and straight to sublinear in (Fig. 16A–D), with long, basal to subbasal paired, straight process, process about half as long as shaft; or compressed and straight (Fig. 17B–D) with very short paired, acuminate process basally, length of process less than diameter of shaft. Dorsal apodeme and preatrium short, shorter than shaft (about 1/5 length of shaft). Gonopore incised longitudinally into apex, symmetrical (Fig. 15B, D, F); or oblique from subapex dorsally to less than half of ventral margin (Fig. 16A–D); or approximately half of ventral margin (Fig. 17B, C, D)

Style. Relatively short (ratio of length to width, 1.9–2.4); anterior lateral arm either wide and apex rounded, in line with mid-section, or acuminate and obtusely angled to mid-section; anterior medial arm short; apophysis half as wide as width across preapical lobe; apophysis either scalpriform in lateral view (Fig. 15I), or digitate, curved lateroposteriad (Fig. 16E) or acuminate, angled lateroposteriad (Fig. 17F), apophysis 0.3–0.4 times as long as greatest length of style; situated basally in subgenital plate (Figs 15O, 16J, 17H).

Connective. Stem and arms short, of similar proportions, greatest length 0.9–1.1 times greatest width; stem 0.5–0.7 times as wide as width across arms; arms widely separated, parallel to subparallel, U-shaped with stem; stem 0.8–1.1 times longer than length of arms (Figs 15G, 16F, G, 17E).

Female. Genital capsule. **Sternite 7.** Slightly shorter (median length) than greatest width (0.7–0.8 times longer than wide), with lateral margin convergent, posterior margin variable, with very shallow V-shaped notch or without notch (Figs 15M, 16M).

Valvifer 1. Slightly longer than wide, dorsal and ventral margins broadly rounded, anterior margin truncated and posterior margin acute (Fig. 12A, J), or rectangular (Fig. 13C, F) or elongated and pointed anterior and posterior margins (Fig. 14A, C, E). In dorsal view valvifers fused membranously at apex, dorsal margin right-angled mediad.

Valvula 1. Lanceolate, curvate (Figs 12A, 13H). Sculpture submarginal along dorsal margin, attaining about half-length, reticulate, maculose (Fig. 13I, J, K) (as categorized by Zahniser and Dietrich 2008).

Valvifer 2. Elongate, with group of sensory setae, margin attached to valvula 3 rounded or rectangular (Figs 12C, I, 13D, G, 14D)

Valvula 2. About apical half serrate (Figs 12B, G, 13D, L, 14D), with trough and crest with fine teeth (Figs 12D, E, H, K, 14B); midsection with sclerotized dorsal margin.

Valvula 3. Single row of submarginal macrosetae (Figs 12C, F, 13A, B, E, 14F).

Etymology. Named the yellow-red hopper, in Latin, yellow, *flavus*, red, *ruber*, nouns in apposition and flying, *volatus*. Gender Masculine.

Discussion. The three species in this genus are recognized by their color and configuration of the aedeagus. *Flavorubivolatus glabriverpus* sp. nov. is yellowish (Fig. 10A, E) with a concavely curved aedeagal shaft without spines (Fig. 15A, C, E), and *F. tensiverpus* sp. nov. and *F. curtiverpus* sp. nov. are more reddish (Figs 10F–I, 11A–D, respectively) with the former with a straight shaft and spines about half as long as the shaft (Fig. 16A–D) and *F. curtiverpus* sp. nov. with the spines short, shorter than the diameter of the shaft (Fig. 17C, D). Low numbers of specimens of *F. tensiverpus* sp. nov. as well as lack of females of *F. curtiverpus* sp. nov. and their overlapping localities and collection dates with specimens of *F. glabriverpus* sp. nov. has detracted from the robust species hypothesis. However, no parasites or parasitoids were found in any of the examined specimens, although the sex-altering effect of *Wolbachia* (Negri et al. 2009; Saridaki and Bourtzis 2010) was considered, but the males of these species do not appear to be feminized. No parts were considered deformed or intermediate, or teneral. None of the specimens of the *Flavorubivolatus* gen. nov. collected by the author were on *Dicerothamnus rhinocerotis*, the only known associated plant of *Renosteria*.

This new genus resembles *Renosteria* in macroptery, similar triangular crown (i.e., species of *Renosteria* 71.9–78.7°, species of *Flavorubivolatus* gen. nov. 85.1–92.8°), and the corresponding longitudinal, rectangular sternite 7. It differs from *Renosteria* in color (species of *Renosteria* are yellow-green (Fig. 13G–I) or brown (*R. overbergia* and *R. cangica* similar, as in Fig. 11F), compared to yellow or reddish in *Flavorubivolatus*) and in its slightly larger length from apex of vertex to apex of tegmina, i.e. 3.5–4.2 mm in *Renosteria*, compared to 2.6–3.8 mm in *Flavorubivolatus*. It also differs in the following aspects of the male genitalia.

The male pygofer lobe in *Renosteria* is obtusely or acutely triangular or rounded, with the process origin dorsomedial or subapical or apical, straight or sublinear, orientation ventrad or posteroventrad. In contrast the pygofer lobe in *Flavorubivolatus* gen. nov. is broadly rounded, with the process origin apical, curvate or straight, orientation ventrad or mediad.

The aedeagus in *Renosteria* is convexly curvate (*R. cangica*, *R. goudinica*, *R. overbergia*, *R. spadix*, *R. waverena*), concavely curvate (*R. montagua*, *R. piquetia*), or sinuous (*R. albanensis*, *R. hantamensis*, *R. hoekoensis*, *R. karosella*) or straight (*R. ceresensis*); aedeagal process about as long as shaft, or half as long as shaft (*R. goudinica*), origin usually on atrium or preatrium, rarely on the shaft (*R. overbergia*, *R. piquetia*). The aedeagus in *Flavorubivolatus* is convexly curvate without process (*F. glabriverpus* sp. nov.) or straight to sublinear with straight process half as long as shaft (*F. tensiverpus* sp. nov.) or very short (*F. curtiverpus* sp. nov.) with origin subbasally on shaft.

The connective in *Renosteria* with ratio of greatest length to greatest width 1.09–1.31. In *Flavorubivolatus* gen. nov. the ratio of greatest length to greatest width similar, 0.95–1.22 in *F. glabriverpus* sp. nov., or slightly shorter, 0.82–1.00 in *F. tensiverpus* sp. nov., 0.93–1.04 in *F. curtiverpus* sp. nov. Other ratios such as width stem/width arm, length stem/length arm and length stem/width arm correspond.

The subgenital plate in *Renosteria* requires re-examination, but corresponds in arrangement of macrosetae, with length to width ratio 1.5–1.9 times longer than wide. In *Flavorubivolatus* gen. nov. it is 1.6–1.9 times longer than wide.

The style in *Renosteria* requires re-examination, with the anterior lateral lobe acutely angled to the sagittal plane through the apophysis and mid-section, and in *Flavorubivolatus* gen. nov. it is approximately in line with the sagittal line.

Key to *Flavorubivolatus* gen. nov. males.

1 Male with aedeagus curved concavely (Fig. 15E), shaft edentate; pygofer lobe process short, 3× longer than wide, curved posteroventrad (Fig. 15K, L, N); subgenital plate apex narrowly rounded (Fig. 15O) .... ***F. glabriverpus* sp. nov.**

1' Male with aedeagus straight with long or short basal or subbasal paired acuminate process; pygofer lobe with short medioposteriad process or long mediad process; subgenital plate apex broadly rounded or truncated........... **2**

2 Male aedeagus with process about half as long as length of shaft (Fig. 16A–D), origin ventrally subbasally on shaft; pygofer lobe process short, linear to sinuous, orientation medioposteriad (Fig. 16H, I, K, N); subgenital plate apex broadly rounded (Fig. 16J)................................ ***F. tensiverpus* sp. nov.**

2' Male aedeagus with short process (length shorter than diameter of shaft), ventrobasally (Fig. 17C, D); pygofer lobe process straight, angled mediad (Fig. 17G, J); subgenital plate apex truncated (Fig. 17H).............................. .... ***F. curtiverpus* sp. nov.**

***Flavorubivolatus glabriverpus* sp. nov.**

http://zoobank.org/E1FFAE31-717D-4DC9-8D10-1300C1E78429

Figures 10A–E, 12A–K, 13A, B, 15A–Q, 18B

Material examined. Type locality: Republic of South Africa, Western Cape Province, Vanrhynsdorp, Gifberg Pass summit, -31.77, 18.76, 700 m, 9 Oct. 2002, M. Stiller leg., sweeping, *Myrovernix* sp., Asteraceae.

Type specimen. Holotype male, pinned, with genitalia in a separate microvial. Original label: "R.S.A., Gifberg Pass summit Vanrhynsdorp, -31.75, 18.70, 9.x.2002, 700 m, M. Stiller leg." "sweeping, *Myrovernix* sp., Asteraceae" "SANC Pretoria Dbase CCDL18270 (blue paper)".

Paratypes. 36♂♂, 54♀♀, 13 nymphs

South Africa • 7♂♂, 9♀♀; Western Cape Province, Sederberge; -32.13, 18.98; 12 Dec. 1971; J.G. Theron leg.; sweeping; SANC Pretoria Dbase CCDL27822.

South Africa • 4♂♂, 9♀♀; Western Cape Province, Clanwilliam Cedarberg; -32.13, 18.98; 21 Dec. 1976; J.G. Theron leg.; sweeping; SANC Pretoria Dbase CCDL27804.

South Africa • 1♂; Western Cape Province, Clanwilliam; -32.16, 18.88; 10 Aug. 1978; J.G. Theron leg.; sweeping; SANC Pretoria Dbase CCDL27825.

South Africa • 4♂♂, 1♀; Western Cape Province, Piekenierskloof; -32.62, 18.95; 18 Jan. 1983; J.G. Theron leg.; sweeping; SANC Pretoria Dbase CCDL27826.

South Africa • 2♂♂, 1♀; Western Cape Province Citrusdal, Middelberg Pass; -32.63, 19.15; 1 Mar. 1985; J.G. Theron leg.; sweeping, *Elytropappus scaber*, Asteraceae; SANC Pretoria Dbase CCDL27828.

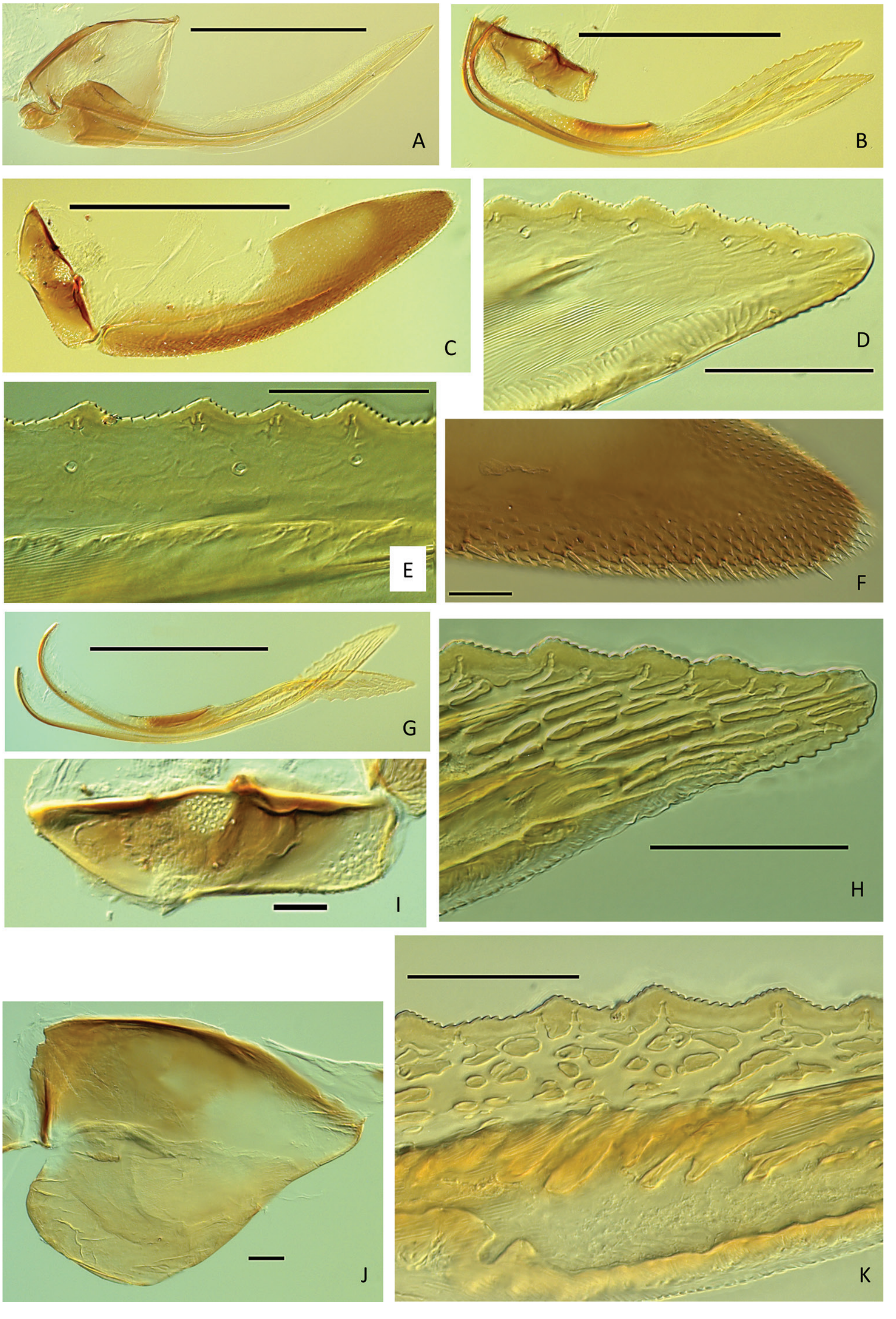

Figure 12. *Flavorubivolatus glabriverpus* gen. nov. & sp. nov. ovipositor **A** valvula 1 and valvifer 1, Dwarsrivier **B** valvula 2 and valvifer 2, Dwarsrivier **C** valvula 3 and valvifer 2, Dwarsrivier **D** valvula 2, apex, Dwarsrivier **E** valvula 2, midsection, Dwarsrivier **F** valvula 3, apex, Dwarsrivier **G** valvula 2, Clanwilliam **H** valvula 2, Sederberge **I** valvifer 2, Dwarsrivier **J** valvifer 1, Clanwilliam **K** valvula 2, midsection, Sederberge. Scale bars: 0.5 mm (**A–C**, **H**); 0.05 mm (**D–G**, **I–K**).

South Africa • 2♂♂, 3♀♀; Western Cape Province, Bokfontein; -33.03, 19.31; 8 Mar. 1985; J.G. Theron leg.; sweeping, *Metalasia muricata*, Asteraceae; SANC Pretoria Dbase CCDL27827.

South Africa • 1♀; Western Cape Province, Algeria Forest Station; -32.373, 19.057; 9 Mar. 1985; J.G. Theron leg.; sweeping; SANC Pretoria Dbase CCDL27830.

South Africa • 2♂♂; Western Cape Province, Cedarberg, Eikeboom; -32.45, 19.16; 9 Mar. 1985; J.G. Theron leg.; sweeping, *Elytropappus scaber*, Asteraceae; SANC Pretoria Dbase CCDL27823.

South Africa • 11♂♂, 19♀♀; ibid. holotype. SANC, BMNH, INHS.

South Africa • 2♂♂, 7♀♀, 3 nymphs; Western Cape Province, Cedarberg, SE Citrusdal, Dwarsrivier Farm; -32.45, 19.2; 10–15 Oct. 2002; M. Stiller leg.; sweeping, *Myrovernix intricata*, Asteraceae; SANC Pretoria Dbase CCDL18271.

South Africa • 6♂♂, 14♀♀, 10 nymphs; Western Cape Province, Cedarberg, SE Citrusdal, Driehoek Farm; -32.433, 19.216; 13 Oct. 2002; M. Stiller leg.; sweeping, *Myrovernix* spp and *Seriphium saxatilis*, Asteraceae, plants mostly sterile, intertwined; SANC Pretoria Dbase CCDL18273.

Diagnosis. Male with aedeagal shaft curvate convexly, immaculate (Fig. 15A–F). Subgenital plate with apex narrowly rounded (Fig. 15O). Anal tube shallowly incised into pygofer (Fig. 15J, K). Pygofer lobe process short, curvate, orientation posteroventrad (Fig. 15K, L, N). Female with sternite longitudinally rectangular (Fig. 15M).

Male. Measurements. n=41. Length from apex of crown to apex of tegmina 2.87–3.03 mm. Crown median length 0.47–0.52 mm. Crown length next to eye 0.32–0.35 mm. Pronotum length 0.34–0.37 mm. Head width across eyes 0.94–1.02 mm. Pronotum width 0.86–0.94 mm. Ocellus diameter 24.9–34.8 μm; interocular distance 37.3–48.8 μm. Crown angle by trigonometry 87.7–92.0°.

Genitalia. Anal tube. Square dorsally and laterally, attached at apex of pygofer (Fig. 15J, K).

Pygofer. Viewed laterally about as long as wide. Basal fold straight, angled about 45° (Fig. 15K).

Pygofer lobe. Posterior margin approximately rectangular, posteroventral margin with membranous, rounded lobe and sclerotized acuminate, curvate process, process about 3 times longer than wide; process origin posteromedially (Fig. 15K, L, N). Subbasally with membranous disc-shaped lobe, orientation mediad (Fig. 15L, N).

Subgenital plate. Acutely triangular, apex narrowly rounded, lateral margin sinuous, medial margin straight, divergent, at about 30° (Fig. 15O). Ratio of length to width 1.8–2.0 times longer than basal width. Apex orientation posteriad (Fig. 15K).

Valve. Posterior margins slightly concave, medial apex triangular (Fig. 15O).

Aedeagus. Shaft immaculate, narrow, tubular. Shaft in lateral view curvate, concave, apex narrowed, about half as wide as subapex (Fig. 15F). Shaft straight in dorsal or ventral view (Fig. 15A, C). Gonopore subapical, incised dorsoventrally

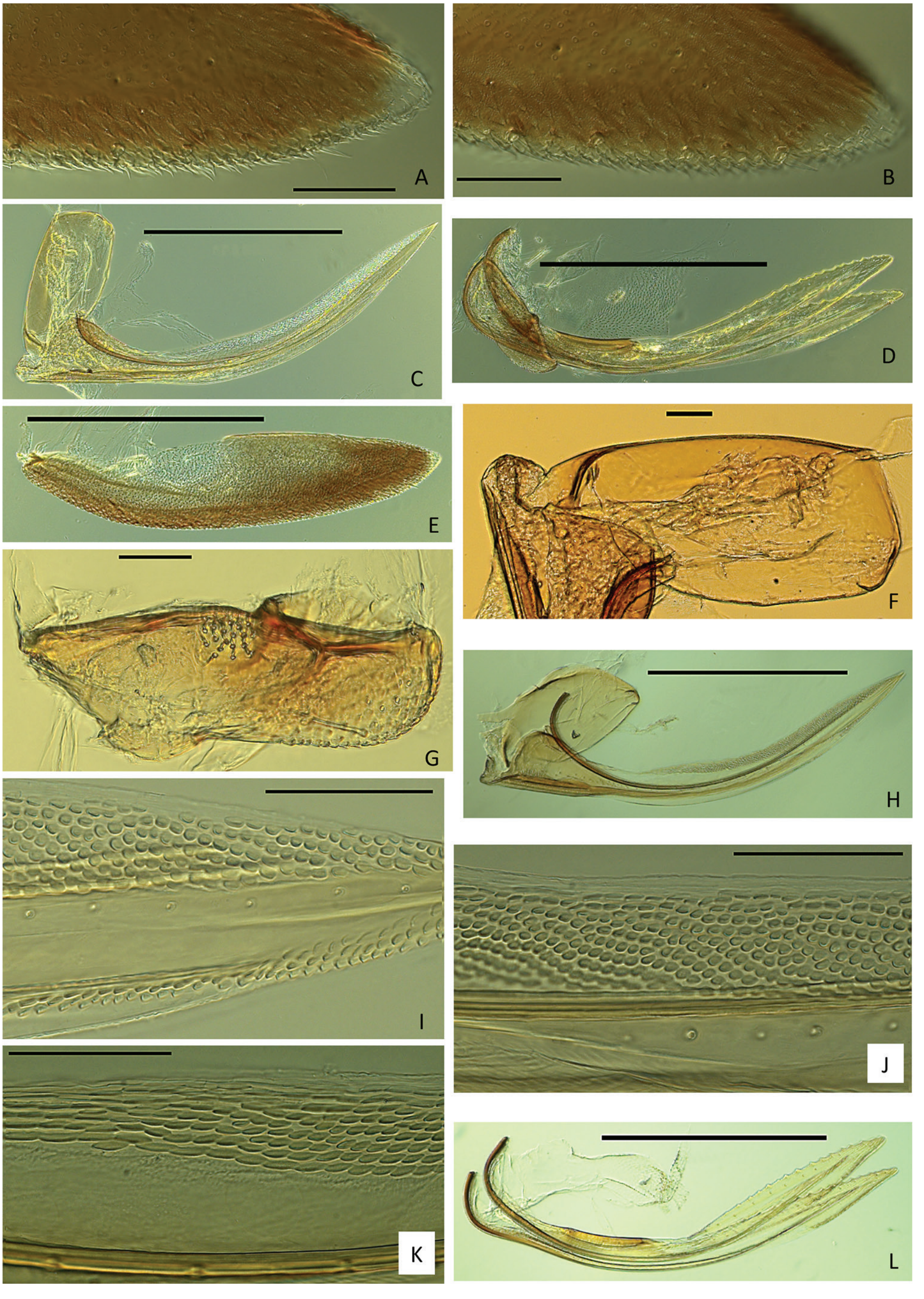

Figure 13. *Flavorubivolatus* gen. nov. ovipositor **A–B** *F. glabriverpus* sp. nov. **A** valvula 3, apex, Sederberge **B** valvula 3, apex, Sederberge **C–L** *F. tensiverpus* sp. nov. **C** valvula 1 and valvifer 1, Clanwilliam **D** valvula 2 and valvifer 2, Clanwilliam **E** valvula 3, Clanwilliam **F** valvifer 1, Clanwilliam **G** valvifer 2, Clanwilliam **H** valvula 1 and valvifer 1, Doltuin **I** valvula 2 apex, Doltuin **J** valvula 2 midsection, Doltuin **K** valvula 2 base, Doltuin **L** valvula 2, Doltuin. Scale bars: 0.05 mm (**A**, **B**, **F**, **G**, **I–K**); 0.5 mm (**C–E**, **H**, **L**).

(Fig. 15B, D, F). Dorsal apodeme elongate, about one quarter as long as shaft, preatrium short (Fig. 15E).

Connective. Ratio greatest length/greatest width=1.01–1.25, length stem/length arm=0.76–1.06, width stem/width arm=0.53–0.69 (Fig. 15G).

Style. Apophysis apex acute in dorsal view (Fig. 15H), in lateral view, rectangular (Fig. 15I). Preapical lobe right-angled; anterior lateral arm with sides parallel, apex rounded; length apophysis 0.3–0.5 times longer than greatest length of style; greatest length/greatest width=1.8–2.2.

Female. Measurements. n=66. Length from apex of crown to apex of tegmina 2.96–3.41 mm. Crown median length 0.48–0.54 mm. Crown length next to eye 0.31–0.37 mm. Pronotum length 0.34–0.38 mm. Head width across eyes 0.97–1.06 mm. Pronotum width 0.88–0.97 mm. Ocellus diameter 25.6–35.7 µm; interocular distance 38.4–49.6 µm. Crown angle by trigonometry 87.3–92.0°.

Genital capsule. Sternite 7. Almost rectangular, base wider than apex, lateral margins convergent (Fig. 15M); 0.7–0.8 times longer than greatest width; distal margin with shallow V-shaped notch, laterally margins broadly rounded.

Valvifer 1. Dorsal and ventral margins rounded, asymmetric. Anterior and posterior margins narrowly rounded (Fig. 12J). Elongated or about as long as wide.

Valvula 1. Sculpture similar to that of *F. tensiverpus*, i.e. maculose. Valvula and valvifer in Fig.12A.

Valvifer 2. As in Fig. 12I as attached to valvula 3 (Fig. 12C).

Valvula 2. Apical half denticulate (Fig. 12B, G), with fine serration in trough between crests (Fig. 12D, E, H, K). Specimens with poorly developed sculpture (Fig. 12D, E) and well developed sculpture (Fig. 12H, K).

Valvula 3. Uniseriate setae apically and subapically, 4–10, average and standard deviation 7.8±1.7 µm, longest 34.5 µm, shortest, 12.3 µm (Figs 12C, F, 13A, B).

Etymology. Latin, adjective and noun in apposition, for hairless, smooth, bald, *glabra*, and the aedeagal shaft which is devoid of any spines or processes. Gender Masculine.

Distribution. Bokfontein, Citrusdal, Clanwilliam, Driehoek farm, Dwarsrivier, Gifberg Pass, Piketberg, Sederberge, Fig. 18B, green squares.

Discussion. *Flavorubivolatus glabriverpus* has the crown and pronotum yellowish, and the tegmina yellowish-red with this color pattern similar in males and females. *Flavorubivolatus tensiverpus* and *F. curtiverpus* are more reddish in color. Variation was found in male genitalia in apex of aedeagus, with the apex of the gonopore parallel or convergent (Fig. 15A, B). Measurement of subgenital plate variable, especially width due to imperfect horizontal orientation. The style was shorter than in other species of this genus. Connective with arms and stem of similar proportions. Dissections included 21 males and 13 females, thus 57% of males and 24% of females. No recently dissected males were parasitized, but one female abdomen contained a stylops and one female with a dryinid pupal case lateroventrally between the head and pronotum. Plant distribution records of some associated plants in Fig. 18E, F (*Seriphium saxatilis*, *Myrovernix intricata* respectively). The color pattern of *Renosteria spadix* corresponded to that of *F. glabriverpus*.

Flavorubivolatus tensiverpus sp. nov.

http://zoobank.org/DAB69824-C705-432C-9379-D91E71A53362
Figures 10F–I, 11A, 13C–L, 16A–N, 18B

Material examined. Type locality: Republic of South Africa, Western Cape Province, Cedarberg near Clanwilliam, -32.35, 18.98, 21 Dec. 1976, J.G. Theron leg.

Type specimen. Holotype male, pinned, with genitalia in a separate microvial. Original label: "South Africa, Sederberge, 21.xii.1976, J.G. Theron" "SANC Pretoria Dbase CCDL27824 (blue paper)".

Paratypes. 8♂♂, 4♀♀, 1 nymph.

South Africa • 5♂♂, 2♀♀; ibid. holotype, SANC, BMNH.

South Africa • 1♂, 1♀; Western Cape Province, Halfmanshof; -33.14, 18.96; 17 Dec. 1981; J.G. Theron leg.; sweeping, *Elytropappus glandulosa*, Asteraceae; SANC Pretoria Dbase CCDL27829.

South Africa • 1♂; Western Cape Province, Cedarberg wilderness, site 1; -32.4000, 19.0378; 14 Dec. 2016; M. Stiller leg.; sweeping, *Phylica plumigera*, Rhamnaceae; SANC Pretoria Dbase CCDL27831.

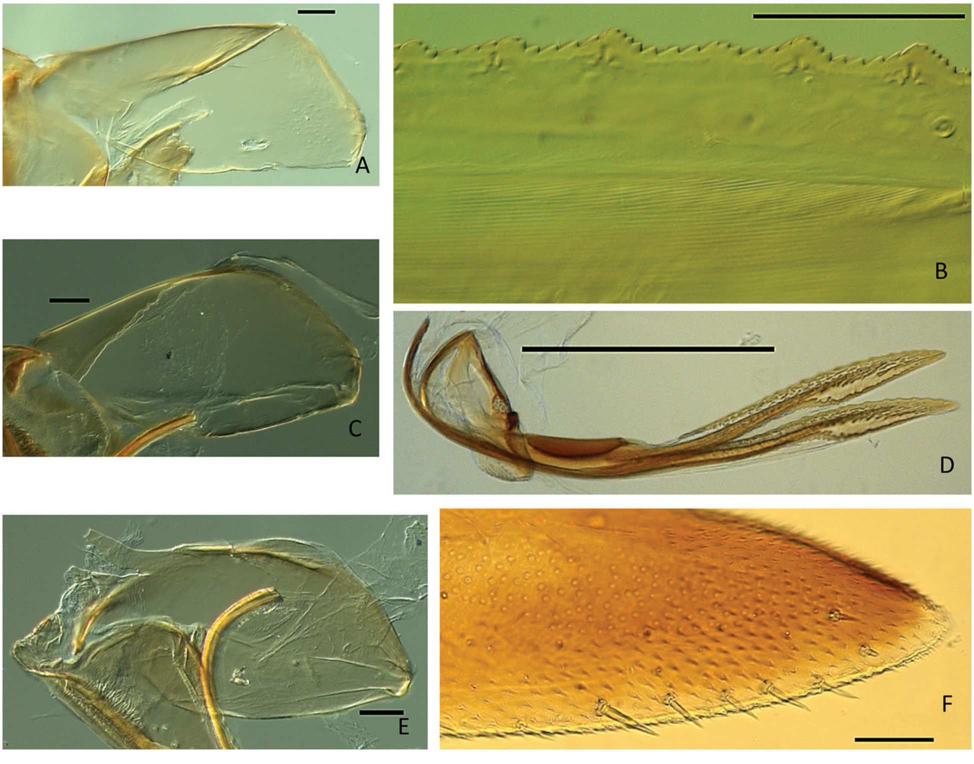

Figure 14. *Flavorubivolatus tensiverpus* gen. nov. & sp. nov. ovipositor **A** valvifer 1, Doltuin **B** valvula 2, midsection, Doltuin **C** valvifer 1, Halfmanshof **D** valvula 2 and valvifer 2, Halfmanshof **E** valvifer 1, Halfmanshof **F** valvula 3, apex, Halfmanshof. Scale bars: 0.05 mm (**A–C**, **E**, **F**); 0.5 mm (**D**).

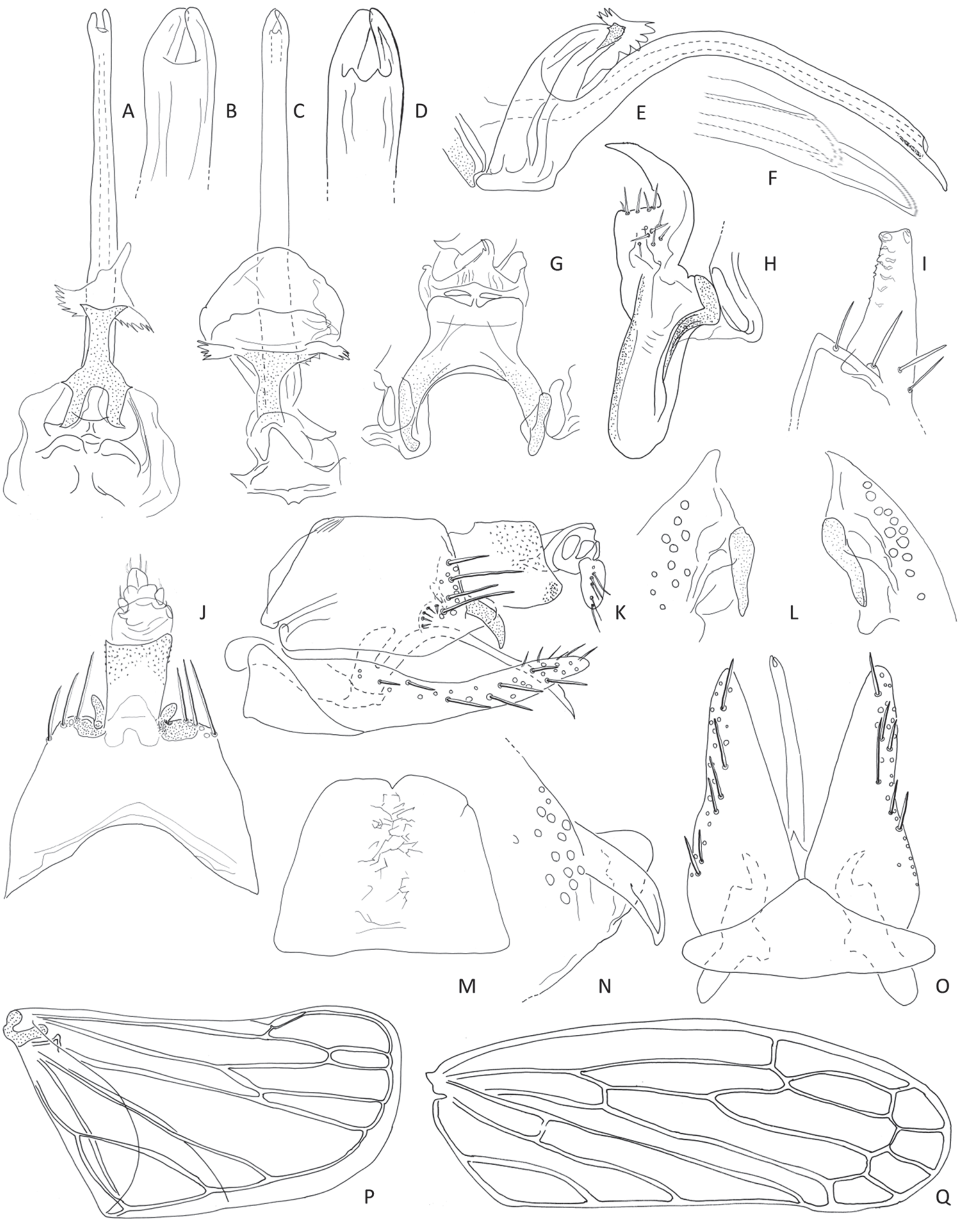

Figure 15. *Flavorubivolatus glabriverpus* gen. nov. & sp. nov. male genitalia, wings and ovipositor **A** aedeagus, dorsal **B** aedeagus, apex, ventral **C** aedeagus, dorsal **D** aedeagus, apex dorsal **E** aedeagus, lateral **F** aedeagus apex, lateral **G** connective **H** style **I** style, apex, lateral **J** genital capsule, dorsal **K** genital capsule, lateral **L** genital capsule, caudal **M** sternite 7 **N** pygofer lobe, process, lateral **O** subgenital plate **P** hind wing **Q** tegmina.

South Africa • 1♂, 1♀, 1 nymph; Northern Cape Province, Oorlogskloof, Doltuin; -31.4790, 19.0790; 19 Dec. 2016; M. Stiller leg.; sweeping; SANC Pretoria Dbase CCDL26687.

Diagnosis. Male with aedeagal shaft straight, ventrally at base with long (about half as long as shaft) paired tooth-like process (Figs 16A–D). Subgenital plate with apex broadly rounded (Fig. 16J). Pygofer lobe process short, sinuous, orientation medioposteriad (Fig. 16I, K, N). Female with sternite 7 transversely rectangular (Fig. 16M).

Male. Measurements. n=6. Length from apex of crown to apex of tegmina 3.15–3.34 mm. Crown median length 0.39–0.41 mm. Crown length next to eye 0.29–0.31 mm. Pronotum length 0.34–0.37 mm. Head width across eyes 0.94–0.98 mm. Pronotum width 0.86–0.89 mm. Ocellus diameter 27.0–34.2 μm; interocular distance 43.5–58.0 μm. Crown angle by trigonometry 98.6–101.4°.

Genitalia. Anal tube. Conical dorsally, square laterally. Incised about half way into pygofer (Fig. 16H, L).

Pygofer. Viewed laterally about as long as wide. Basal fold straight, angle about 45° (Fig. 16L).

Pygofer lobe. Apex broadly rounded, ventroposterior margin with medial and apical, membranous, disc-shaped structure. Sclerotized, short acuminate process on ventroposterior margin, orientation medioposteriad. Process sinuous, about 4 times longer than wide, with subapical ventral tooth, apices disjunct (Fig. 16H, K, N).

Subgenital plate. Apex narrowly rounded. Macrosetae 2–3 irregular rows. Ratio of length to width 1.6–1.8 times longer than basal width (Fig. 16J). Apex orientation posteriad (Fig. 16L).

Valve. Posterior margins broadly rounded (Fig. 16J).

Aedeagus. Base or subbase of shaft ventrally with elongate paired process, about half as long as shaft, parallel and contiguous with shaft; shaft sublinear. Gonopore elongate, subapical dorsally to ventromedially. Dorsal apodeme and preatrium subequal in length (Fig. 16A–D).

Connective. Ratio greatest length/greatest width=0.91–1.07, length stem/length arm=0.78–1.21, width stem/width arm=0.47–0.60 (Fig. 16F, G).

Style. Apophysis apex narrowly rounded. Preapical lobe rounded; anterior lateral arm with sides subparallel, apex narrowly rounded; arm 0.6 times longer than distal part (Fig. 16E).

Female. Measurements. n=4. Length from apex of crown to apex of tegmina 3.27–3.35 mm. Crown median length 0.41–0.42 mm. Crown length next to eye 0.30–0.32 mm. Pronotum length 0.36–0.37 mm. Head width across eyes 0.98–1.01 mm. Pronotum width 0.87–0.91 mm. Ocellus diameter 29.3–40.7 μm; interocular distance 56.0 μm. Crown angle by trigonometry 99.5–100.6°.

Genital capsule. Sternite 7. Ratio of greatest length: greatest width 0.63–0.70 (Fig. 16M).

Valvifer 1. Dorsal and ventral margins subparallel (Fig. 13C, F) or broadly rounded, asymmetric (Figs 13H, 14A, C, E). Anterior and posterior margins narrowly rounded. Elongated or about as long as wide.

Valvula 1. Sculpture maculose (Fig. 13I–K) and minimally strigate basally (Fig. 13K).

Valvifer 2. As in Fig. 13G.

Valvula 2. Apical half denticulate (Figs 13D, L, 14D), with fine serration in trough between crests (Fig. 14B).

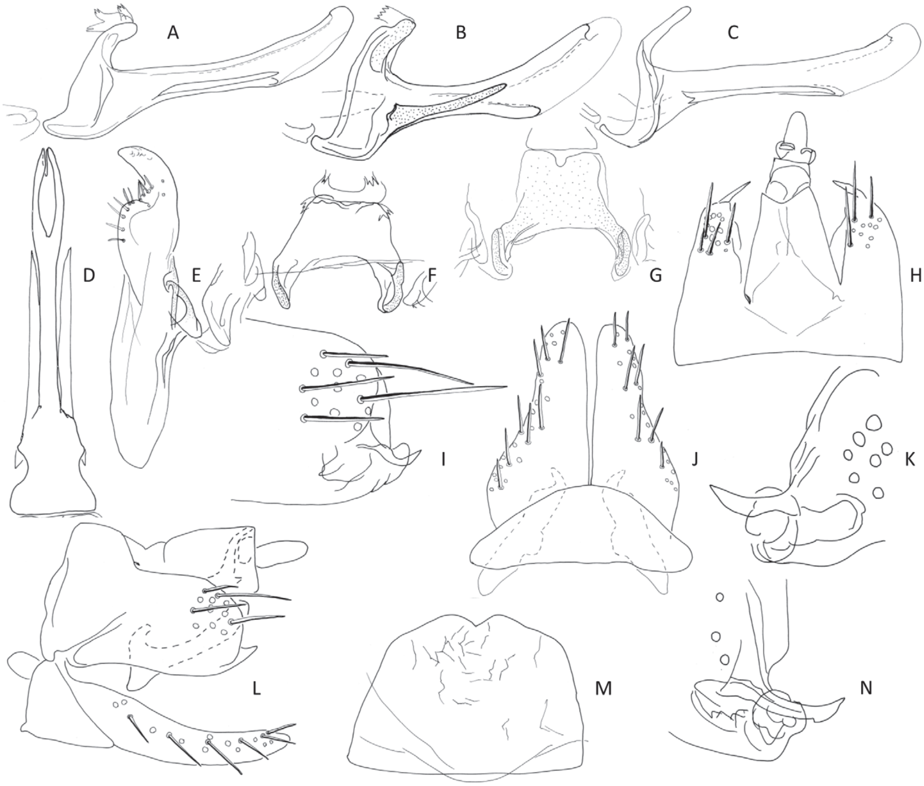

Figure 16. *Flavorubivolatus tensiverpus* gen. nov. & sp. nov. male genitalia and ovipositor **A** aedeagus, lateral, Clanwilliam **B** aedeagus, lateral, Doltuin **C** aedeagus, lateral, Clanwilliam **D** aedeagus, ventral, Clanwilliam **E** style **F** connective, Doltuin **G** connective, Clanwilliam **H** genital capsule, dorsal **I** pygofer lobe, lateral **J** subgenital plate **K** pygofer lobe, caudal **L** pygofer lobe, lateral **M** sternite 7 **N** pygofer lobe, caudal.

Valvula 3. Long setae subapically and submarginally (Fig. 14F).

Etymology. Named in Latin, adjective and noun in apposition, for the long, drawn out, *tensus*, spine on the shaft of the aedeagus (*verpa*). Gender Masculine.

Distribution. Cedarberg, Clanwilliam, Doltuin, Halfmanshof, Fig. 18B, red circle.

Discussion. *Flavorubivolatus tensiverpus* is distinctly more red in the crown, pronotum and tegmina than yellowish color of *F. glabriverpus*. Measurements show that the crown length medially is slightly shorter, i.e. 0.4 mm and in the other species 0.4–0.5 mm. Genitalia in the male with aedeagal shaft linear to sublinear, position and orientation of basal processes (Fig. 16A–C), especially in Halfmanshof specimen, where the processes are more basal, slightly shorter and the apex of the shaft slightly wider than in the other species of this genus (Fig. 16B, compare Fig. 16A, C, Clanwilliam). Arms of the connective appear asymmetrical, but this is due to orientation during examination (Fig. 16F, G). The connective arms and medial arms of the styles are angled dorsad. Dissections included 8 males and 4 females and signs of parasites absent, i.e. no larva inside abdomen or pupal case.

Plant records of *Phylica oleifolia* in Fig. 18D. A record of *Renosteria waverena* from Halfmanshof, with same date as above, but with clear differences in male genitalia and color to that of *F. tensiverpus*.

Flavorubivolatus curtiverpus sp. nov.

http://zoobank.org/B62DC8F0-FCC4-489A-843C-70ED03AA9C74

Figures 11B–D, 17A–L

Material examined. Type locality: Republic of South Africa, Western Cape Province, Sederberge [Cedarberg], -32.13, 18.98, 12 Oct. 1971, J.G. Theron leg.

Type specimen. Holotype male, pinned, with genitalia in a separate microvial. Original label: "South Africa, Sederberge [Cedarberg], 12-10-71, J.G. Theron" "SANC Pretoria Dbase CCDL27862 (blue paper)".

Paratypes. 7♂♂, 1♀.

South Africa • 3♂♂, 1♀; ibid. holotype.

South Africa • 2♂♂; Western Cape Province, Cedarberg SE Citrusdal, Dwarsrivier Farm; -32.45, 19.2; 10–15 Oct. 2002; M. Stiller leg.; sweeping grass and forbs regrowth after fire; SANC Pretoria Dbase CCDL18272.

South Africa • 1♂; Western Cape Province, Cedarberg, SE Citrusdal, Driehoek Farm; -32.433, 19.216; 13 Oct. 2002; M. Stiller leg.; path the cedar wood forest sweeping low vegetation; SANC Pretoria Dbase CCDL27805.

South Africa • 1♂; Western Cape Province, Blinkberg Pass, -32.73, 19.43, 6 May 2011, M. Stiller leg.; SANC Pretoria Dbase CCDL28141.

Diagnosis. Aedeagal shaft straight, ventrally at base with very short, paired tooth-like process (Fig. 17C, D). Subgenital plate with apex truncated (Fig. 17H). Pygofer lobe process right-angled mediad, elongate, with apices contiguous (Fig. 17G, J), apices variably serrate (Fig. 17K, L). Female unknown.

Male. Measurements. n=7. Length from apex of crown to apex of tegmina 3.0–3.3 mm. Crown median length 0.4–0.5 mm. Crown length next to eye 0.3 mm. Pronotum length 0.4 mm. Head width across eyes 0.9–1.0 mm. Pronotum width 0.9 mm. Ocellus diameter 27.3–34.7 µm; interocular distance 44.3–57.7 µm. Crown angle by trigonometry 92.7–96.8°.

Genitalia. Anal tube. Conical dorsally, rectangular laterally. Incised about three quarters into pygofer (Fig. 17G, J).

Pygofer. Viewed laterally longer than wide (Fig. 17G). Basal fold straight, angled about 45° (Fig. 17G).

Pygofer lobe. Apex broadly rounded, medioposterior margin with medial and apical membranous disc-shaped structure (Fig. 17G, J). Compressed process on medioposterior margin, sclerotized, straight, long, orientation mediad (Fig. 17J–L). Process with apical and subapical ventral teeth; apices contiguous (Fig. 17K, L).

Subgenital plate. Apex truncated (Fig. 17H). Macrosetae in 2–3 irregular rows. Length to width 1.6–1.8 times longer than basal width at confluence of plate and valve. Apex orientation dorsoposteriad (Fig. 17G).

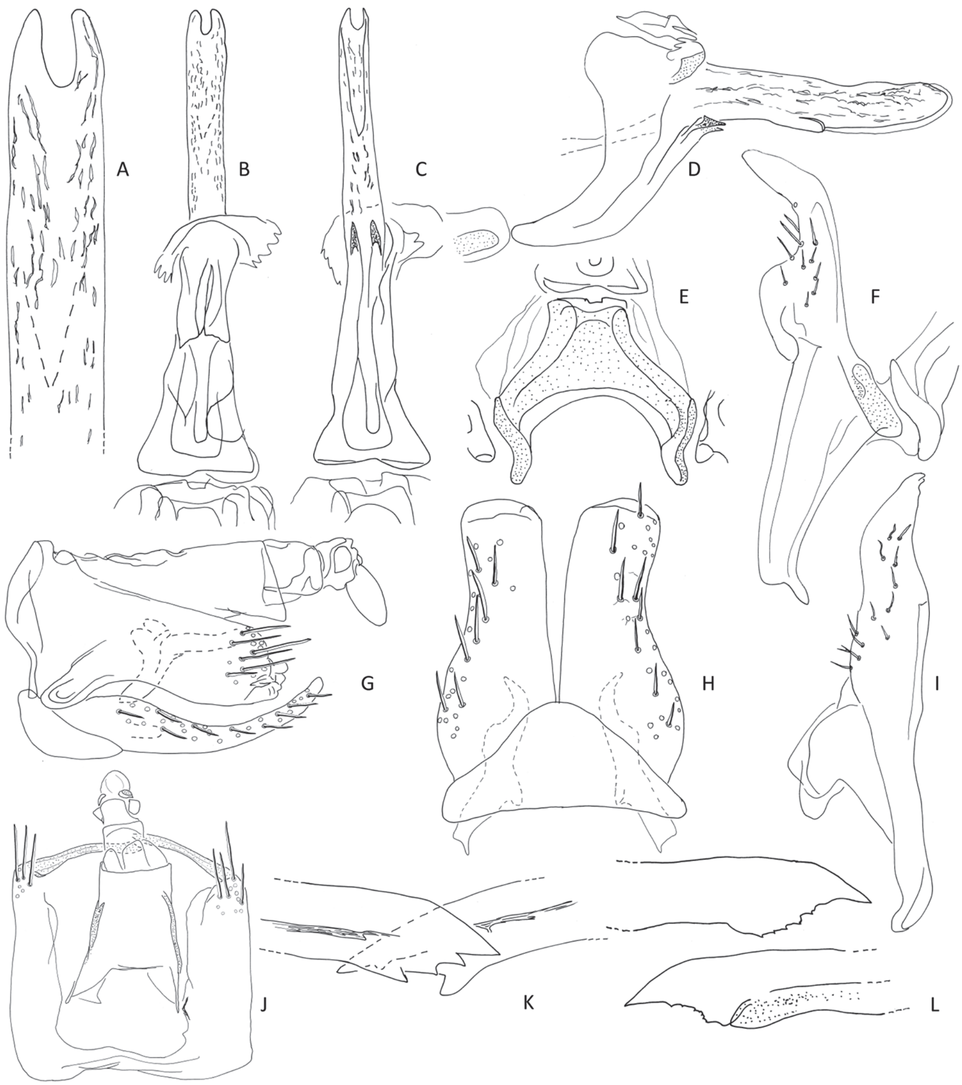

Figure 17. *Flavorubivolatus curtiverpus* gen. nov. & sp. nov. male genitalia **A** aedeagus, apex **B** aedeagus, dorsal **C** aedeagus, ventral **D** aedeagus, lateral **E** connective **F** style **G** genital capsule, lateral **H** subgenital plate, ventral **I** style, lateral **J** pygofer, dorsal **K** pygofer process, caudal, Sederberge **L** pygofer process, caudal, Dwarsrivier.

Valve. Posterior margins broadly rounded (Fig. 17H).

Aedeagus. Base of shaft ventrally with short paired acuminate process; length of process less than width of shaft. Shaft straight (Fig. 17B–D). Gonopore elongate, subapical dorsally to ventromedially (Fig. 17A, C). Shaft with striate microsculpture (Fig. 17A). Dorsal apodeme reduced, preatrium elongate (Fig. 17D).

Connective. Ratio stem length: greatest width 0.9 (Fig. 17E).

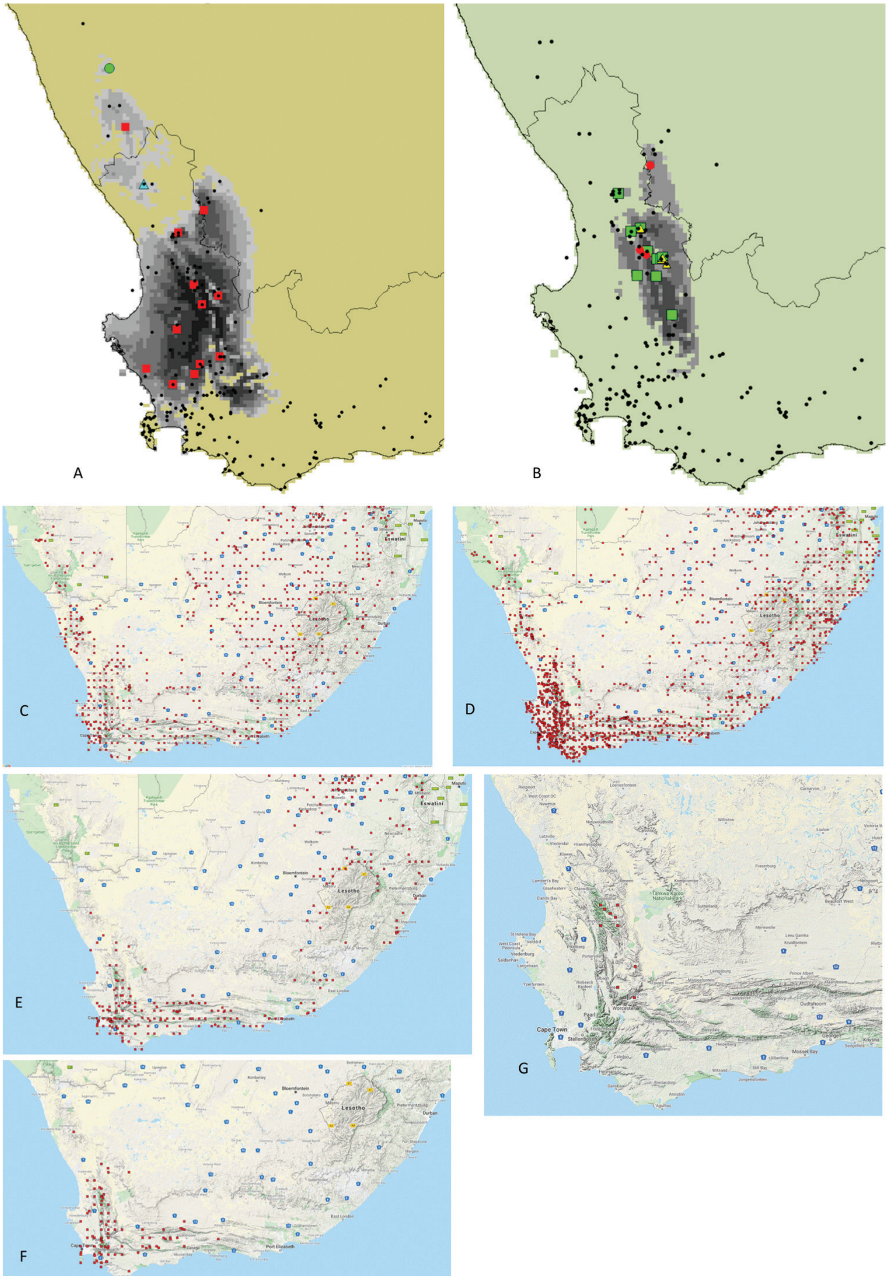

Figure 18. Distribution models for *Retevolatus* gen. nov. and *Flavorubivolatus* gen. nov. and distribution maps of some associated plants **A** potential natural distribution in south western part of South Africa (Western and Northern Cape Province), *R. flexiverpus* sp. nov., red square, *R. semicurviverpus* sp. nov., green circle, *R. subspiniverpus* sp. nov., blue triangle **B** potential natural distribution in south western part of South Africa (Western Cape Province), *Flavorubivolatus* spp, *F. glabriverpus* sp. nov., green square, *F. tensiverpus* sp. nov., red circle, *F. curtiverpus* sp. nov., yellow triangle **C** *Salvia lanceolata* **D** *Phylica oleifolia* **E** *Seriphium saxatilis* **F** *Myrovernix intricata* **G** *Selago pustulosa*.

Style. Apophysis apex narrowly rounded. Preapical lobe rounded; anterior lateral arm with sides convergent, apex acute; arm 0.4–0.6 times longer than distal part (Fig. 17F, lateral view Fig. 17I, macrosetae dorsal).

Female. Unknown.

Etymology. Latin, short, adjective and noun in apposition, *curtus*, for the short spine of the aedeagus, *verpa*. Masculine.

Distribution. Driehoek farm, Dwarsrivier, Sederberge, Fig. 18B, yellow triangle.

Discussion. The reddish color (Fig. 11B–D) is similar to the color of *F. tensiverpus* (Figs 11F–I, 12A) which distinguish these two species from *F. glabriverpus*, that is yellowish (Fig. 10A, E). Pygofer lobe processes variable in apical serration, i.e. length and number of teeth (Fig. 17K, L). The truncated, blunt apex of the subgenital plate and the elongated, transverse pygofer lobe process can clearly be distinguished on whole specimens (Fig. 11D), and that allow distinction between this species and *F. glabriverpus* and *F. tensiverpus*. The single female listed in material examined, (image in Fig. 10B) is tentatively included here. This species consists of a short series of males with overlapping records in one or other of the two species above. Signs of parasites or feminized specimens were absent, with all genitalia considered invariable, functional and distinct from *F. glabriverpus* and *F. tensiverpus*. All males were dissected. Records of an associated plant, *Selago pustulosa*, in Fig. 18G.

Distribution models

Distributions were modelled with the species from the most localities (i.e. *R. flexiverpus*) as well as most numerous species and all species merged, with the latter model for *Retevolatus* in Fig. 18A and for *Flavorubivolatus* in Fig. 18B, the former with a wider potential distribution. The first four Worldclim bioclimatic variables with the highest contribution to these models differed slightly. In *Retevolatus* they were bio19, 18, 8 and 15, and in *Flavorubivolatus* bio8, 15, 18 and 19. Bio8 is mean temperature in wettest quarter (winter), bio15 is precipitation seasonality, bio18 is precipitation in warmest quarter (summer) and bio19 is precipitation in coldest quarter (winter). Despite the wide distribution of some of the associated plants (Fig. 18C–G), the range of these leafhoppers appears restricted to a small area. Personal observation of species on plants resembling *Seriphium saxatilis* in the northern parts of South Africa have not produced specimens of *Flavorubivolatus*. Extensive work on the leafhoppers associated with *Dicerothamnus rhinocerotis* by Theron has not shown that *Flavorubivolatus* was associated with this plant.

Conclusions

Although the new genera described here are placed in Bonaspeiini this placement is not fully resolved due to the ambiguous definitions of Bonaspeiini and Athysanini in Zahniser and Dietrich (2013) which bear a number of similarities. The attempt here and previously (Stiller 2019a, b, 2020) was to better quantify dimension of parts such as the anal tube, connective and style. At present three configurations of wings are recognized in genera included in Bonaspeiini, i.e. tegmina covering abdominal segments 2–3, hind wing reduced (*Basutoia*, *Bretega*, *Tzitzikamaia*); tegmina covering up to abdominal segments 7–9, hind wing reduced, narrower or shorter than tegmina (*Bloemia*, *Bonaspeia*, *Caffrolix*, *Cerus*, *Colistra*, *Curvostylus*, *Gcaleka*, *Hadroca*, *Johanus*, *Kaapia*, *Megaulon*, *Proekes*, *Proekoides*, *Refrolix*, *Salsocolila*, *Salsolibia*); tegmina extended beyond abdomen, hind wing as long as tegmina and with functional jugal lobe (*Capeolix*, *Discolopeus*, *Geelus*, *Flavorubivolatus*, *Kimbella*, *Renosteria* and *Retevolatus*); at present alary polymorphism has not been observed in these genera. An additional character which may be useful in grouping species is the presence or absence and position of the pygofer process; in some groups the process is marginal or medial with further subcategories for both such as dorsal, apical and ventral. Properties of the pygofer process such as denticulation, curvature and orientation appear unsuited for generic categories. The anal tube, connective, style and aedeagus require further investigation towards contribution of tribal placement.

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Appendix 1.

Table A1. Specimen and species records.

Genus species	AccN0	males	females	country	province	locality	Lat_Dec/Lon_Dec	Date	collector	plant	family
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL27849	1		South Africa	Western Cape Province	Olifants River between Citrusdal and Clanwilliam	-32.36, 18.95	1931/10/15	SA Museum Staff		
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL27850	17	4	South Africa	Western Cape Province	Piketberg	-32.9, 18.75	1971/10/26	J.G. Theron		
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL27847	6	5	South Africa	Western Cape Province	Citrusdal	-32.6, 19.05	1971/11/09	F. Honibal		
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL27842		1	South Africa	Western Cape Province	Slagboom Farm Agter Witsenberg	-33.23, 19.2667	1973/01/06	J.G. Theron		
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL27848	2	2	South Africa	Western Cape Province	Citrusdal	-32.6, 19.05	1973/11/05	F. Honibal		
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL27845	3	1	South Africa	Western Cape Province	Gouda	-33.31, 19.03	1974/10/30	J.G. Theron		
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL27846	3		South Africa	Western Cape Province	Hermon	-33.43, 18.96	1974/10/30	J.G. Theron		
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL27853	9	7	South Africa	Western Cape Province	Klipheuwel	-33.56, 18.7	1974/11/24	J.G. Theron	*Maytenus heterophylla*	Celastraceae
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL27854	1	11	South Africa	Western Cape Province	Garies Kamiesberg	-30.46, 18.13	1976/10/15	J.G. Theron		
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL27844	7	6	South Africa	Western Cape Province	Clanwilliam Cedarberg	-32.5, 19.25	1976/12/21	J.G. Theron		
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL27843	2	2	South Africa	Western Cape Province	Darling	-33.37, 18.38	1981/12/18	J.G. Theron		

Genus species	AccN0	males	females	country	province	locality	Lat_Dec/Lon_Dec	Date	collector	plant	family
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL18349		2	South Africa	Western Cape Province	Wiedouw Farm base of Gifberg Pass	-31.73, 18.766	2002/10/03	M. Stiller	*Salvia lanceolata*	Lamiaceae
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL18350	1		South Africa	Western Cape Province	Wiedouw Farm base of Gifberg Pass	-31.73, 18.766	2002/10/03	M. Stiller	*Diosma hirsuta*	Rutaceae
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL18351		1	South Africa	Western Cape Province	Wiedouw Farm base of Gifberg Pass	-31.73, 18.766	2002/10/03	M. Stiller	*Phylica oleifolia*	Rhamnaceae
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL18352	1		South Africa	Western Cape Province	Wiedouw Farm base of Gifberg Pass	-31.73, 18.766	2002/10/03	M. Stiller	*Passerina truncata* subsp. *truncata* and sweeping trees and shrubs at night	Thymelaeaceae
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL18347	1		South Africa	Northern Cape Province	Doring River waterfall N Nieuwoudtville	-31.32, 19.116	2002/10/07	M. Stiller	*Galenia africana*	Aizoaceae
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL27851	5	6	South Africa	Northern Cape Province	Brakwater Oorlogskloof	-31.47, 19.079	2016/12/17	M. Stiller	*Diospyros austro-africana*	Rhamnaceae
Retevolatus semicurviverpus gen. nov. & sp. nov.	CCDL18345	12	10	South Africa	Northern Province	Biesiesfontein Farm S Springbok	-29.75, 17.933	2002/09/29	M. Stiller	*Searsia undulata*	Anacardiaceae
Retevolatus semicurviverpus gen. nov. & sp. nov.	CCDL18346	1		South Africa	Northern Province	Biesiesfontein Farm S Springbok	-29.75, 17.933	2002/09/29	M. Stiller	light trap	
Retevolatus subspiniverpus gen. nov. & sp. nov.	CCDL27852	30	16	South Africa	Western Cape Province	Nuwerus	-31.14, 18.35	1971/11/10	J.G. Theron		

Table A2. Specimen and species records.

Genus species	AccN0	males	female	nymph	country	province	locality	Lat_Dec/Lon_Dec	BeginDate	EndDate	collector	plant	family
Flavorubivolatus glabriverpus gen. nov. & sp. nov.	CCDL27822	7	9		South Africa	Western Cape Province	Sederberg	-32.13, 18.98	1971/10/12		J.G. Theron		
Flavorubivolatus glabriverpus gen. nov. & sp. nov.	CCDL27825	1			South Africa	Western Cape Province	Clanwilliam	-32.16, 18.88	1978/08/10		J.G. Theron		
Flavorubivolatus glabriverpus gen. nov. & sp. nov.	CCDL27804	4	9		South Africa	Western Cape Province	Clanwilliam Cedarberg	-32.5, 19.25	1976/12/21		J.G. Theron		
Flavorubivolatus glabriverpus gen. nov. & sp. nov.	CCDL47826	4	1		South Africa	Western Cape Province	Piekenierskloof	-32.62, 18.95	1983/01/18		J.G. Theron		
Flavorubivolatus glabriverpus gen. nov. & sp. nov.	CCDL27827	2	3		South Africa	Western Cape Province	Bokfontein	-33.03, 19.31	1985/03/08		J.G. Theron	*Metalasia muricata*	Asteraceae
Flavorubivolatus glabriverpus gen. nov. & sp. nov.	CCDL27828	2	1		South Africa	Western Cape Province	Middelberg, Citrusdal	-32.63, 19.15	1985/03/09		J.G. Theron	*Elytropappus scaber*	Asteraceae
Flavorubivolatus glabriverpus gen. nov. & sp. nov.	CCDL27830		1		South Africa	Western Cape Province	Clanwilliam, Algeria Forest Station	-32.373, 19.057	1985/03/09		J.G. Theron		
Flavorubivolatus glabriverpus gen. nov. & sp. nov.	CCDL27823	2			South Africa	Western Cape Province	Cedarberg, Eikeboom	-32.45, 19.16	1985/03/09		J.G. Theron	*Elytropappus scaber*	Asteraceae
Flavorubivolatus glabriverpus gen. nov. & sp. nov.	CCDL18270	12	19		South Africa	Western Cape Province	Gifberg Pass Summit Vanrhynsdorp	-31.77, 18.76	2002/10/09		M. Stiller	*Myrovernix* sp.	Asteraceae
Flavorubivolatus glabriverpus gen. nov. & sp. nov.	CCDL18271	2	7	3	South Africa	Western Cape Province	Dwarsrivier Farm Cedarberg SE Citrusdal	-32.45, 19.2	2002/10/10	2002/10/15	M. Stiller	*Myrovernix intricata*	Asteraceae
Flavorubivolatus glabriverpus gen. nov. & sp. nov.	CCDL18273	6	14	10	South Africa	Western Cape Province	Driehoek Farm Cedarberg SE Citrusdal	-32.433, 19.216	2002/10/13		M. Stiller	*Myrovernix* spp. and *Seriphium saxatilis*, plants mostly sterile, intertwined	Asteraceae

Genus species	AccN0	males	female	nymph	country	province	locality	Lat_Dec/Lon_Dec	BeginDate	EndDate	collector	plant	family
Flavorubivolatus tensiverpus gen. nov. & sp. nov.	CCDL27824	6	3		South Africa	Western Cape Province	Cedarberg near Clanwilliam	-32.35, 18.98	1976/12/21		J.G. Theron		
Flavorubivolatus tensiverpus gen. nov. & sp. nov.	CCDL27829	1	1		South Africa	Western Cape Province	Halfmanshof	-33.14, 18.96	1981/12/17		J.G. Theron		
Flavorubivolatus tensiverpus gen. nov. & sp. nov.	CCDL27831	1			South Africa	Western Cape Province	Cedarberg wilderness #1	-32.4, 19.037	2016/12/14		M. Stiller	*Eriocephalus* sp.	Asteraceae
Flavorubivolatus tensiverpus gen. nov. & sp. nov.	CCDL26687	1	1	1	South Africa	Northern Cape Province	Doltuin Oorlogskloof	-31.479, 19.079	2016/12/19		M. Stiller	*Phylica plumigera*, male on *Eriocephalus* sp. Asteraceae	Rhamna-ceae
Flavorubivolatus curtiverpus gen. nov. & sp. nov.	CCDL27862	4	1		South Africa	Western Cape Province	Sederberge	-32.13, 18.98	1971/10/12		J.G. Theron		
Flavorubivolatus curtiverpus gen. nov. & sp. nov.	CCDL18272	2			South Africa	Western Cape Province	Dwarsrivier Farm Cedarberg SE Citrusdal	-32.45, 19.2	2002/10/10	2002/10/15	M. Stiller	*Selago pustulosa*	Scrophu-lariaceae
Flavorubivolatus curtiverpus gen. nov. & sp. nov.	CCDL27805	1			South Africa	Western Cape Province	Driehoek Farm Cedarberg SE Citrusdal	-32.433, 19.216	2002/10/13		J.G. Theron	low vegetation	
Flavorubivolatus curtiverpus gen. nov. & sp. nov.	CCDL28141	1			South Africa	Western Cape Province	Blinkberg Pass	-32.73, 19.43	2011/05/06		M. Stiller		

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CHECKLIST

African Invertebrates
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Checklist of the spiders (Araneae) of Kenya

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Abstract

A checklist of 805 spider species and subspecies belonging to 57 families described and/or reported from Kenya up to 31 December 2018 is provided. Species distribution within Kenya is given according to counties and specific localities. A historical survey is provided and each record is presented in its original combination. The list is dominated by members of the families Salticidae and Linyphiidae (160 and 110 species, respectively). Eighteen families are represented by a single species. About 300 species are known exclusively from Kenya and 158 species are sub-endemics. Two hundred and forty two species are described from a single sex (159 females and 83 males) and 24 from juveniles. Nairobi County has the greatest number of records, five counties had a frequency of one, while nine counties had no collection records. There are two fossil spiders known from Kenya belonging to the family Oonopidae. One new combination is proposed: *Hypsosinga holzapfelae* (Lessert, 1936), **comb. nov.** (ex. *Araneus* Clerck, 1757).

Keywords

Africa, Aranei, endemic, fauna, new combination, new record, sub-endemic

Table of contents

Introduction........ 49
Study area 50
History........ 50
Materials and methods 51
Note........ 51
Results and discussion 52
County abbreviations........ 55
Checklist........ 55
Agelenidae C. L. Koch, 1837 55
Anapidae Simon, 1895........ 58
Araneidae Clerck, 1757........ 58
Atypidae Thorell, 1870 71
Barychelidae Simon, 1889 71
Caponiidae Simon, 1890 71
Cheiracanthiidae Wagner, 1887 72
Cithaeronidae Simon,1893 74
Clubionidae Wagner, 1887 75
Corinnidae Karsch, 1880 76
Ctenidae Keyserling, 1877 78
Cyatholipidae Simon, 1894 80
Cyrtaucheniidae Simon, 1889........ 81
Deinopidae C. L. Koch, 1850........ 82
Dictynidae O. Pickard-Cambridge, 1871........ 82
Dipluridae Simon, 1889 83
Eresidae C. L. Koch, 1845 83
Gnaphosidae Pocock, 1898........ 85
Hahniidae Bertkau, 1878........ 90
Hersiliidae Thorell, 1870 92
Idiopidae Simon, 1889 93
Linyphiidae Blackwall, 1859 94
Liocranidae Simon, 1897........ 114
Lycosidae Sundevall, 1833 115
Migidae Simon, 1889 121
Mimetidae Simon, 1881 121
“Miturgidae” Simon, 1886........ 122
Mysmenidae Petrunkevitch, 1928 122
Ochyroceratidae Fage, 1912........ 122
Oecobiidae Blackwall, 1862........ 123
Oonopidae Simon, 1890........ 123
Oxyopidae Thorell, 1870 127
Palpimanidae Thorell, 1870 130
Philodromidae Thorell, 1870 130

Pholcidae C. L. Koch, 1850 132
Phyxelididae Lehtinen, 1967 137
Pisauridae Simon, 1890 138
Prodidomidae Simon, 1884 141
Salticidae Blackwall, 1841 142
Scytodidae Blackwall, 1864 172
Segestriidae Simon, 1893 172
Selenopidae Simon, 1897 173
Sicariidae Keyserling, 1880 174
Sparassidae Bertkau, 1872 174
Telemidae Fage, 1913 176
Tetrablemmidae O. Pickard-Cambridge, 1873 176
Tetragnathidae Menge, 1866 176
Theraphosidae Thorell, 1869 180
Theridiidae Sundevall, 1833 182
Theridiosomatidae Simon, 1881 193
Thomisidae Sundevall, 1833 193
Titanoecidae Lehtinen, 1967 200
Trachelidae Simon, 1897 200
Trochanteriidae Karsch, 1879 201
Uloboridae Thorell, 1869 201
Zodariidae Thorell, 1881 201
Zoropsidae Bertkau, 1882 206
Conclusion 206
Acknowledgements 207
References 207

Introduction

Spiders, or Araneae, are one of the largest orders of animals, with over 48000 extant species belonging to 128 families (WSC 2018). Orders that embrace more species than spiders include only Coleoptera, Diptera, Lepidoptera, Hymenoptera, Hemiptera and Acari (Zhang 2011). During the last decade, the number of new species descriptions of spiders varies from 400/yr to over 1000/yr (WSC 2020). Dippenaar-Schoemann and Jocqué (1997) reported 71 families, 893 genera and over 5000 species from Sub-Saharan Africa and, over the years, many more species descriptions from the region have been published (WSC 2020). Within Sub-Saharan Africa to the date of this checklist compilation at 2018, only a few countries have published lists of spiders: Botswana (Eagle 1985), Namibia (Griffin and Dippenaar-Schoemann 1991), South Africa (Dippenaar-Schoeman et al. 2010), Sudan (Dunlop and Siyam 2014), Swaziland (Braun 2017), Tanzania (Russell-Smith 2020) and Zimbabwe (FitzPatrick 2001). Amongst these, only the South African atlas of spiders (Dippenaar-Schoeman et al. 2010) provided detailed information about species' distribution within the country.

The most detailed lists are those from South Africa and Tanzania. According to Jocqué et al. (2013), who provided the number of species known from Sub-Saharan Africa, Kenya ranked seventh, after South Africa (2207), Madagascar (853), Tanzania (722), Ethiopia (704), DR Congo (630) and Namibia (547).

The purpose of this work is to provide an annotated list of species reported from Kenya and their distribution records. This list provides a brief introduction to the current status of arachnology in Kenya by highlighting the most studied families and collection areas. The paper does not contain data published after 31 December 2018.

Study area

Kenya covers an area of 582,646 km^2 in East Africa and is divided into 47 counties (Fig. 1). It lies on the equator, approximately between 4.5° North and 4.5° South latitude and has a diverse topography, including glaciated mountains with snow-capped peaks, mountain forests, the Great Rift Valley with its escarpments and volcanoes, desert landscapes, grasslands and woodlands (Bennun and Njoroge 1999).

The Kenyan Rift Valley runs from north to south, thereby splitting the highlands into eastern and western regions. Ethiopia and South Sudan border Kenya to the north, Somalia to the east, Tanzania to the south and Uganda to the west. Over 10% of the country is designated as protected areas, which are either national parks or reserves or forest reserves (Bennun and Njoroge 1999). Some of the land unused for settlement is under community-managed conservation programmes.

History

Kenya originally belonged to the British East Africa Protectorate and its current borders were not defined until 1920. Prior this date, the area was amalgamated with Uganda in the west and Sudan to the north. After the new boundaries were defined, most of the areas, previously considered northwest Kenya, remain in present-day Uganda and a few areas, previously considered east Kenya, are now within the borders of Somalia (Niox 2013).

African expeditions in the late 19th and early 20th centuries brought about a large number of collectors and hunters who did extensive species surveys, sampling from various ecosystems in Kenya (Tóth et al. 2014). The best known is the Smithsonian–Roosevelt African Expedition led by the former United States president, Theodore Roosevelt, which took place in the early 20th century. Nairobi, the capital city of Kenya where most of the samples were collected, was an undeveloped, mostly forested area. Most of the samples were placed in museums across the globe, with some left in the host museum (National Museums of Kenya), previously known as the Coryndon Museum. Early descriptions of spiders from Kenya were done in the late Victorian period by various authors: O. Pickard-Cambridge (1872), Gerstaecker (1873), Simon (1894, 1897a, b), Pavesi (1883) and Pocock (1897, 1898a, b, c, d). di Caporiacco also made a substantial contribution to Kenyan arachnofauna, especially with his work on specimens from the Meneghetti Expedition of 1944–1946, in which he published 283 species (di Caporiacco 1949).

Materials and methods

The checklist is based on published data, either taxonomic or faunistic papers, published by the end of 2018. Part of the data was sourced from the Royal Museum for Central Africa, National Museums of Kenya and Charles Haddad provided data on Corinnidae. Some of the museum data were not found in any publications and here, these data are indicated as "museum data". Only spiders identified to species are included in this list. The general structure of the checklist follows Zonstein and Marusik (2013). Families and species are arranged alphabetically to facilitate ease of use. A taxonomic authority reference is used for the families, genera and species. A colon is used in references where the author of the taxon differed from the authors of the species record from Kenya. A comma is used for authors to indicate a species' name change.

An asterisk (*) and circumflex (^) are used to indicate the endemic and sub-endemic species, respectively. The term 'endemic' is used for species known only from Kenya. For species known only from Kenya and any of the adjacent countries (Burundi, Ethiopia, Rwanda, Somalia, Sudan, Tanzania or Uganda), the term 'sub-endemic' is used. The distribution is given under two categories: records for specific collection localities within Kenya and general distribution. The latter data are according to the WSC (2018) categorisation and some records are listed according to journals. Counties are shown in alphabetical order. In cases where species were mentioned from Kenya, but the specific collection locality was not indicated in literature, we use the letter 'K'. The frequency for the localities was calculated in terms of the number of times the locality was mentioned in the entire checklist.

The process of extracting the data from the WSC (2018) involved searching within each family individually for specific data parameters. These data specifics included searching for the words "Kenya", "East Africa" and "Africa". The papers that were listed under these distribution categories were then downloaded and searched for the record details on Kenya. We also searched Bonnet's catalogue (1955, 1956, 1957, 1958, 1959) and all taxonomic and faunistic publications dealing with taxa from Eastern Africa published after 1939 [Bonnet's catalogue accommodated data published prior to 1940]. Data were also sourced from faunistic papers which were obtained online or directly from the author.

Note

The list was prepared and submitted at the beginning of 2019. Since then, the number of recognised extant Araneae families has increased from 117 to 128 (WSC 2018, 2020). With a goal of avoiding recalculations, moving species from one family to another, excluding synonyms, adding new localities etc. and to exclude possible mistakes, we follow the taxonomy and family limits of WSC (2018), providing comment if family and species status have changed.

When compiling the checklist, we faced certain difficulties:

1) Species in faunistic papers were difficult to locate because of the scattered literature on Kenyan arachnofauna compared to the species reported in taxonomic publications.
2 In several cases, species recorded from Kenya were not mentioned in the main text, but in the keys or even figure legends. For example, see Wanless (1985).
3) Some localities are stated to be in a particular country, but the data were incorrect or were associated with re-drawing of borders. An example is Kilimanjaro, which was reported as a Kenyan locality, but it is in Tanzania (*Benoitia bornemiszai* (di Caporiacco, 1947)).
4) Some geographical names are spelled differently on different maps from regional variations, human error or place names have changed over time. For example: Leikipia, Lykipia, Laikipia; Taveta, Dafeta; Lake Turkana was earlier called Rudolph Lake.
5) One town, Moyale, is split between Kenya and Ethiopia. di Caporiacco (1939) described and reported over a dozen species from Moyale. Sometimes in the literature concerning species described by di Caporiacco, Moyale is considered to be in Kenya and sometimes it is placed in Ethiopia. Here, we list all species reported from Moyale as reported from Kenya.
6) At least one locality, Karagesi (*Araneus strupifer* (Simon, 1886)), from Pocock (1898c), was not found. The specimen was collected by Emin Pasha (Isaak Eduard Schnitzer), who worked for the Ottoman Empire.
7) Roewer (1960), in his work dealing with Lycosidae from Upemba National Park (Democratic Republic of Congo), mentioned "Kenia" several times, but this refers to a river in Upemba and not the country Kenya.
8) Some papers reported Kenya in the author's language; hence, it was tedious and difficult to determine that the authors described species from Kenya. An example is "Chenia" which is used by di Caporiacco (1940) to refer to Kenya in Italian.

The checklist was compiled from over 350 published articles, with a large part of the references gathered from the WSC (2018). The information was obtained from two different sources: the WSC and faunistic papers which had species lists.

Results and discussion

A total of 805 species in 297 genera from 57 families are reported to occur in Kenya, with 31 species from 28 genera sourced from museum collections (Tables 1, 2). Three-hundred and five species were endemic, 158 were sub-endemic and 24 species were described from juveniles described by Pocock (1898c) and di Caporiacco (1939, 1947, 1949). Two hundred and forty two species were described from a single gender–159 fe-

Table 1. Number of genera, species, endemics and sub-endemic species known from Kenya.

Families	Genera	Species	Species % of Total	Endemic	Endemism %	Sub-endemic
Agelenidae	3	11	1.42	4	36.36	3
Anapidae	1	1	0.13	1	100.00	-
Araneidae	21	64	8.27	7	10.94	5
Atypidae	1	1	0.13	-	0.00	-
Barychelidae	1	1	0.13	-	0.00	-
Caponiidae	1	1	0.13	-	0.00	-
Cithaeronidae	1	1	0.13	-	0.00	1
Clubioniidae	1	5	0.65	-	0.00	5
Corinnidae	10	14	1.81	5	35.71	1
Ctenidae	4	11	1.42	5	45.45	4
Cyatholipidae	1	3	0.39	3	100.00	-
Cyrtaucheniidae	1	3	0.39	3	100.00	-
Deinopidae	1	1	0.13	1	100.00	-
Dictynidae	3	3	0.39	2	66.67	-
Dipluridae	1	1	0.13	-	0.00	-
Eresidae	2	8	1.03	1	12.50	2
Cheiracanthiidae	2	14	1.81	2	14.29	2
Gnaphosidae	11	26	3.36	11	42.31	5
Hahniidae	1	11	1.42	9	81.82	-
Hersiliidae	1	7	0.90	3	42.86	1
Idiopidae	3	4	0.52	4	100.00	-
Linyphiidae	37	107	13.82	57	53.27	20
Liocraniidae	4	5	0.65	5	100.00	-
Lycosidae	15	34	4.39	7	20.59	9
Migidae	1	1	0.13	-	0.00	-
Mimetidae	2	2	0.26	2	100.00	-
Miturgidae	1	1	0.13	-	0.00	1
Mysmenidae	1	1	0.13	1	100.00	-
Ochyroceratidae	2	2	0.26	2	100.00	-
Oecobiidae	1	1	0.13	-	0.00	-
Oonopiidae	9	23	2.97	19	82.61	2
Oxyopiidae	2	13	1.68	1	7.69	7
Palpimanidae	2	3	0.39	2	66.67	1
Philodromidae	2	7	0.90	3	42.86	1
Pholcidae	9	26	3.36	9	34.62	9
Phyxelididae	2	9	1.16	6	66.67	2
Pisauridae	7	14	1.81	1	7.14	-
Prodidomidae	2	2	0.26	2	100.00	-
Salticidae	51	158	20.41	62	39.24	25
Scytodidae	1	1	0.13	-	0.00	-
Segestriidae	1	2	0.26	-	0.00	2
Selenopidae	1	4	0.52	1	25.00	-
Sicariidae	1	4	0.52	-	0.00	2
Sparassidae	5	6	0.78	-	0.00	3
Telemidae	2	2	0.26	2	100.00	-
Tetrablemidae	1	1	0.13	1	100.00	-
Tetragnathidae	5	22	2.84	2	9.09	13
Theraphosidae	3	7	0.90	3	42.86	2
Theridiidae	19	60	7.75	30	50.00	13
Theridiosomatidae	1	1	0.13	1	100.00	-
Thomisidae	15	34	4.39	6	17.65	5
Titanoecidae	1	1	0.13	-	0.00	1
Trachelidae	3	4	0.52	3	75.00	-
Trochanteriidae	1	1	0.13	-	0.00	-
Uloboridae	1	1	0.13	-	0.00	-
Zodariidae	8	22	2.84	14	63.64	4
Zoropsidae	1	1	0.13	-	0.00	-
Total	**291**	**774**	**100.00**	**303**	**39.20**	**151**

Table 2. Museum species number, endemic and sub-endemic species. These are species that were recorded from Museum collections, but not included in any publications.

Family	Genera	Species	Endemic	Sub–endemic
Araneidae	3	4	–	–
Caponiidae	1	1	–	–
Corinnidae	3	3	–	1
Ctenidae	1	2	–	–
Cyatholipidae	1	1	–	–
Eresidae	1	1	–	–
Gnaphosidae	3	3	1	2
Linyphiidae	3	3	–	–
Lycosidae	1	1	–	–
Oecobiidae	1	1	–	–
Oxyopiidae	1	1	–	1
Palpimanidae	1	1	1	–
Philodromidae	1	1	–	–
Pholcidae	1	1	–	1
Salticidae	2	2	–	1
Segestriidae	1	1	–	1
Sparassidae	1	1	–	–
Theridiidae	1	1	–	–
Thomisidae	1	2	–	–
Total	**28**	**31**	**2**	**7**

males and 83 males. Two fossil species have been described from Kenya belonging to the family Oonopidae; *Orchestina longimana* Wunderlich, 1981 and *O. kenyana* Wunderlich, 1981 (Wunderlich 1981). One species and one subspecies described from Kenya were found to be missing from all spider catalogues, including the WSC (2018): *Cyllobelus splendidissimus* di Caporiacco, 1949 and *Cyrtophora citricola obscura* Tullgren, 1910.

Families with the most species were Salticidae (160), Linypiidae (110), Araneidae (68), Theridiidae (61), Thomisidae (36), Lycosidae (35), Pholcidae (27), Gnaphosidae (29), Oonopidae (23), Tetragnathidae (22), Zodariidae (22), Corinnidae (17), Pisauridae (14), Cheiracanthiidae (14), Oxyopidae (14), Ctenidae (13), Hahniidae (11) and Agelenidae (11). Salticidae and Linyphiidae had the highest number of endemic (62, 57) and sub-endemic (26, 19) species, respectively. Eighteen families are known from single species and the other families had less than 10 species representatives (See Tables 1, 2).

The species in the checklist were recorded in 38 out of the 47 counties in Kenya. The counties with the highest collection frequencies included: Nairobi, Nyandarua, Trans Nzoia, Nakuru, Kwale, Nyeri, Taita Taveta, Kakamega, Kajiado, Laikipia, Kiambu, Kilifi, Mombasa and Marasabit. These were selected on the basis of having a collection frequency of more than 30 and were arranged from the highest, Nairobi with 204, to the lowest, Marsabit with 31. Five counties had a frequency of one. Many of the species were studied between the years 1800 and 2000, with minimal study more recently from 2001–2018 (Fig. 2). Salticidae is currently the most-studied family. Revisional work has been done on Kenyan spider fauna of the families Agelenidae and Zodariidae (Jocqué 1990, 1991, 2009; Kioko et al. 2018; Wesołowska and Dawidowicz 2014).

The results above suggest that the spider fauna of Kenya is not that well studied. The number of species from the most well studied families seems understated. For example, Salticidae has over 6000 known species worldwide, while in Kenya only 160 have been recorded. This accounts for about 2.6% of known salticids. The low numbers may be due to our methods of data extraction. Data from some sources, such as citizen science websites, were not considered because the identification of species could not be confirmed. Eighteen of the families were also known by only one record, indicating that a lot of further exploration and study is needed. We also have noted 24 species described from juveniles are doubtful because it is relatively difficult to distinguish immature species morphologically as mature copulatory organs are required for their identification.

Some of the records were not from Kenya but were previously listed as such Kenya in the WSC (2018). These localities may have been within the historical borders of Kenya at the time of species collection, but as the map by Niox (2013) shows, boundaries have shifted over time. However, in some cases, the species were not included because it was clear that the current record represented a different country. Nine of the 47 counties have no collection data, which may indicate a biased selection of some collection areas. Preferential collection sites may be based on particular factors, such as forest cover or protected areas like parks and reserves which are generally less disturbed or contain water bodies. Security of the areas may also be a factor due to community clashes, such as in Mount Elgon, which has been avoided by researchers due to security risks in the past. Collection areas that have only a single species recorded require further exploration.

County abbreviations

All the county abbreviations used here are only for the purpose of simplifying the work on the main checklist.

BM–Bomet, BG–Bungoma, BR–Baringo, BU–Busia, EB–Embu, EM–Elgeyo Marakwet, GS–Garissa, HB–Homa Bay, IS–Isiolo, KB–Kiambu, KI–Kisii, KJ–Kajiado, KK–Kakamega, KL–Kilifi, KR–Kericho, KS–Kisumu, KT–Kitui, KW–Kwale, KY–Kirinyaga, LK–Laikipia, LM–Lamu, MC–Machakos, MD–Mandera, ME–Meru, MI–Migori, MK–Makueni, MM–Mombasa, MS–Marsabit, MU–Murang'a, NA–Nyandarua, NB–Nairobi, ND–Nandi, NI–Nyeri, NK–Nakuru, NR–Narok, NY–Nyamira, SB–Samburu, SY–Siaya, TN–Tharaka Nithi, TR–Tana River, TT–Taita-Taveta, TU–Turkana, TZ–Trans Nzoia, UG–Uasin Gishu, WJ–Wajir, WP–West Pokot, VH–Vihiga.

Checklist

Agelenidae C. L. Koch, 1837

Note. It is very likely that all species of *Agelena* known from Kenya belong to other genera.

^*Agelena dubiosa* Strand, 1908

A. d.: di Caporiacco 1949: 331.

Record. Moyale (Located in both Kenya and Ethiopia).
County. MS.
Distribution. Ethiopia, Kenya, Rwanda.

^*Agelena incertissima* di Caporiacco, 1939

A. i. di Caporiacco, 1939: 315.

Record. Moyale.
County. MS.
Distribution. Known only from three localities in Kenya and Ethiopia.
Note. Described, based on juveniles.

****Agelena keniana* Roewer, 1955 (♀)**

A. k. Roewer, 1955: 28.

Record. Nairobi.
County. NB.
Distribution. Known only from the type locality

***Agelena kiboschensis* de Lessert, 1915**

A. leucopyga k.: di Caporiacco 1940: 781; *A. k.*: Roewer 1955: 41.

Record. Namanga.
County. KJ.
Distribution. Tanzania, Kenya, Democratic Republic of Congo, Rwanda.

^*Agelena nigra* di Caporiacco, 1940 (♀)

A. n.: di Caporiacco, 1949: 331.

Record. Nairobi.
County. NB.
Distribution. Ethiopia, Kenya.

****Malthonica africana* Simon & Fage, 1922 (♀)**

M. a. Simon & Fage, 1922: 551.

Record. Mount Kenya.
County. NI.
Distribution. Known only from the type locality.

Mistaria fagei* (di Caporiacco, 1949) (♀)**

Agelena f. di Caporiacco, 1949: 330; Roewer 1955: 29, *M. f.*: Kioko et al. 2018: 113.

Record. Mau Range.
County. NA.
Distribution. Known only from the type locality.

***Mistaria leucopyga* (Pavesi, 1883)**

Agelena l. Pavesi, 1883: 41; Simon 1909: 41; *M. l.*: Lehtinen 1967: 249; Santos and van Harten 2007:164.

Record. Samburu.
County. SB.
Distribution. Central, East Africa, Yemen.

***Mistaria nairobii* (di Caporiacco, 1949)**

Agelena leucopyga n.: di Caporiacco, 1949: 329, Roewer 1955: 46; *M. n.*: Kioko et al. 2018: 115.

Records. Kakamega, Nairobi.
Counties. KK, NB.
Distribution. Kenya, DR Congo.

****Mistaria nyeupenyeusi* Kioko & Li, 2018**

M. n. Kioko et al., 2018: 120.

Record. Naro Moru.
County. NI.
Distribution. Known only from the type locality.

***Mistaria zorica* (Strand, 1913)** (♀)

Agelena z.: Strand, 1913: 411; Roewer 1955: 40; *M. z.*: Kioko et al. 2018: 118.

Record. Nairobi.

County. NB.
Distribution. Central, East Africa.

Anapidae Simon, 1895

****Metanapis mahnerti*** **Brignoli, 1981 (♂)**

M. m. Brignoli 1981: 120.

Record. Naivasha.
County. NK.
Distribution. Known only from the type locality.

Araneidae Clerck, 1757

Afracantha camerunensis **(Thorell, 1899)** (♀)

Gasteracantha batesi: di Caporiacco, 1949: 425.

Record. Mackinnon Road.
County. KW.
Distribution. West, Central, East Africa.

****Araneus haematomerus*** **(Gerstaecker, 1873) (juv.)**

Epeira haematomera: Gerstaecker, 1873: 491.

Record. Jipe Lake.
County. TT.
Distribution. Known only from the type locality.
Note. WSC (2020) indicates its distribution as Central Africa, although it is known only from the original description (juv.).

****Araneus mauensis mauensis*** **di Caporiacco, 1949 (♀)**

A. m. m. di Caporiacco 1949: 421.

Record. Mau Range.
County. NA.
Distribution. Known only from the type locality.

****Araneus mauensis ocellatus*** **di Caporiacco, 1949 (♀)**

A. m. o. di Caporiacco 1949: 422.

Record. Mau Range.
County. NA.
Distribution. Known only from the type locality.

***Araneus strupifer* (Simon, 1886) (♀)**

A. eresifrons Pocock, 1898c: 509; di Caporiacco 1939: 346.

Records. Karagesi, Leikipia (Lakipia), Mombasa, Taru Desert, Moyale.
Counties. KJ, LK, M, MS.
Distribution. Kenya, Senegal, Tanzania.

^*Araneus sulfurinus* (Pavesi, 1883) (♀)

A. sulphurinus (lapsus pro *sulfurinus*): di Caporiacco, 1949: 419.

Record. Mau.
County. NA.
Distribution. Ethiopia, East Africa.

***Argiope aurocincta* Pocock, 1898**

Argiope a. Pocock, 1898c: 512.

Record. Samburu.
County. SB.
Distribution. Central, East, Southern Africa

***Argiope australis* (Walckenaer, 1805)**

A. suavissima Gerstaecker, 1873; *A. nigrovittata*: Simon, 1890a: 127; 1894: *Argiope nigrovittata*: Pocock, 1898c: 512; *A. banana* and *A. suavissima*: di Caporiacco, 1949: 404; *Argiope suavissima* Gerstaecker, 1873: 495.

Records. Mackinnon Road, Mombasa, Nairobi, Lake Turkana, Taru.
Counties. KJ, KW, MM, NB, TU.
Distribution. Central, East, Southern Africa, Cape Verde Is.

^*Argiope gibberosa* di Caporiacco, 1947 (juv ♀)

A. g. di Caporiacco 1947: 158; di Caporiacco 1949: 408.

Records. Voi (Kenya), Nairobi.

Counties. NB, TT.

Distribution. Kenya and Tanzania.

Note. Known by juvenile specimens and considered as *nomen dubium* (WSC 2018).

***Argiope flavipalpis* (Lucas, 1858)**

A. f.: di Caporiacco 1949: 408; Bjørn 1997: 218; *A. cuspidata*: di Caporiacco, 1949: 408.

Records. Malindi, Nairobi, Olgasaillè.

Counties. KJ, KL, NB.

Distribution. Africa, Yemen.

***Argiope levii* Bjørn, 1997**

A. l. Bjørn 1997: 232.

Record. Malindi.

County. KL.

Distribution. Kenya, Tanzania, South Africa.

***Argiope lobata* (Pallas, 1772)**

Aranea l.: Pocock, 1898c: 512.

Record. Taru.

County. KJ.

Distribution. Old World and Australasia.

***Argiope sector* (Forsskål, 1776)**

A. s.: di Caporiacco 1940: 819.

Record. no precise records.

County. K.

Distribution. According to WSC (2018), it is distributed in North Africa, Middle East and Cape Verde Is.

Note. It is mentioned as occurring in Kenia in the paper dealing with Ethiopia. Can be based on misidentification, accounting that it was not properly reported from Eastern Africa.

***Argiope trifasciata* (Forsskål, 1775)**

Metargiope t.: di Caporiacco, 1949: 409; *A. t.* Bjørn 1997: 226; Warui et al. 2004:18.

Records. Elmenteita, Lac Jipe, Kabete, Mau, Molo, Mpala Ranch, Nairobi.
Counties. LK, NA, NB, NK, TT.
Distribution. North and South America. Introduced to Africa, Japan, Australia.

***Caerostris mitralis* (Vinson, 1863)**

C. petersi: di Caporiacco, 1949: 423.

Records. Elmenteita, Kabete.
Counties. NB, NK.
Distribution. Central Africa, Madagascar.
Note. Most likely, the noted records of this species refer to *C. sexcuspidata* (Fabricius, 1793), a single species properly documented from the region (cf. Grasshoff 1984).

***Caerostris sexcuspidata* (Fabricius, 1793)**

C. kibonotensis: di Caporiacco, 1949: 423.

Records. Elmenteita, Mackinnon Road, Mau, Nairobi.
Counties. KW, NA, NB, NK.
Distribution. Africa and adjacent Islands of Madagascar, Comoros and Seychelles (Aldabra).

***Caerostris vicina* (Blackwall, 1866)**

C. nodulosa: Pocock, 1898c: 514; di Caporiacco, 1949: 423.

Records. Mackinnon Road, Samburu, Taru.
Counties. KJ, KW, SB.
Distribution. Central, East, Southern Africa.

***Cyclosa formosa* Karsch, 1879** (♀)

Salassina f.: Pocock, 1898c: 513.

Records. Samburu and Taru.
Counties. KJ, SB.
Distribution. East, West Africa.

***Cyclosa insulana* (Costa, 1834)**

C. i.: di Caporiacco 1949: 409; Warui et al. 2004: 18.

Records. Nairobi, Mpala Ranch.

Counties. LK, NB.

Distribution. Mediterranean to Japan, India to Papua New Guinea, Australia, Kenya.

***Cyclosa lawrencei* di Caporiacco, 1949** (♀)

C. l. di Caporiacco 1949: 409.

Record. Kabete.

County. KB.

Distribution. Known only from the type locality.

^*Cyclosa tripartita* Tullgren, 1910 (♀)

C. t.: di Caporiacco 1949: 409.

Records. Elmenteita, Nairobi.

Counties. NB, NK.

Distribution. Kenya, Tanzania.

***Cyrtophora citricola* (Forsskål, 1775)**

C. c.: Pocock 1898c: 512.

Record. Taru.

County. KJ.

Distribution. Southern Europe, Africa, Near East, Pakistan, India, China, Japan. Introduced to Dominican Rep., Costa Rica, Colombia, Brazil.

^*Cyrtophora citricola obscura* Tullgren, 1910 (♀)

C. c. o.: di Caporiacco 1949: 410.

Records. Elmenteita, Kabete, Nairobi, Mau.

Counties. NA, NA, NK.

Distribution. Kenya, Tanzania.

Note. This subspecies is missing in Bonnet's catalogue (1956).

***Eriovixia napiformis* (Thorell, 1899)**

Araneus n.: di Caporiacco, 1940: 822.

Record. no precise records.

County. K.
Distribution. Cameroon to East Africa and Yemen.
Note. It is mentioned as occurring in Kenia in the paper dealing with Ethiopia.

***Gasteracantha falcicornis* Butler, 1873** (♀)

Gasteracantha toxotes Gerstaecker, 1873: 489; *G. resupinata* Gerstaecker, 1873: 490; *G. resupinata*: Pocock, 1898c: 516; *G. f.*: Dahl 1914: 277; di Caporiacco 1949: 424; Benoit 1962: 56.

Records. Bura, Mackinnon Road, Kikwesi, Witu Mombasa, Taru Desert, Tsavo River, Rhino Camp, Taita Hills, Taveta.
Counties. KJ, KW, ME, MM, TT.
Distribution. Africa.

***Gasteracantha milvoides* Butler, 1873**

G. m.: Benoit 1962: 59

Records. Nairobi, Voi.
County. NB, TT.
Distribution. Central, East, Southern Africa.

***Gasteracantha sanguinolenta* C. L. Koch, 1844**

G. impotens Gerstaecker, 1873: 491; *G. s. ensifera*: di Caporiacco 1949: 424.

Records. Nairobi, Mombasa.
Counties. MM, NB.
Distribution. Africa, Yemen (mainland, Socotra), Seychelles.

***Gasteracantha versicolor formosa* Vinson, 1863**

G. v. f.: di Caporiacco 1949: 424.

Record. Kabete.
County. KB.
Distribution. Kenya, Madagascar.

***Gasteracantha versicolor* (Walckenaer, 1841)**

G. scapha Gerstaecker, 1873: 487; *G. scapha*: Simon, 1890b: 127; *G. v. v.*: di Caporiacco 1949: 425.

Records. Mackinnon Road, Nairobi, Taveta.

Counties. KW, NB, TT.

Distribution. Central, East, Southern Africa.

Hypsosinga holzapfelae **(de Lessert, 1936), comb. nov.**

Araneus holzapfeli de Lessert, 1936: 246.

Record. Kilindini.

County. MM.

Distribution. Kenya, Mozambique, South Africa.

Note. The species was described, based on specimens from Mozambique and Kenya. The figures provided by de Lessert (1936) and comparison of this species with *Hypsosinga albovitta albovittata* (Westring, 1851) leave no doubts that it belongs to *Hypsosinga* and, therefore, transferred to this genus. Male palp of *H. holzapfelae* is most similar to those in *H. pygmaea* (Sundevall, 1831); however, it has clear differences in the shape of the tegulum. Females of two species have different shape of epigyne. The species ending was changed from *-i* to *-ae* because it is a matronym (WSC 2020).

^*Hypsosinga lithyphantoides* **di Caporiacco, 1947**

Hyposinga l. l. di Caporiacco, 1949: 413.

Records. Elmenteita, Nairobi.

Counties. NB, NK.

Distribution. Kenya, Uganda.

*****Hypsosinga lithyphantoides dealbata*** **di Caporiacco, 1949**

Hyposinga l. d. di Caporiacco, 1949:414

Record. Nairobi.

County. NB.

Distribution. Known only from the type locality.

Isoxya cicatricosa **(C. L. Koch, 1844)**

Gasteracantha (*I.*) *c.:* di Caporiacco, 1949: 425; *I. c.*: Benoit 1962: 38.

Records. Nairobi, Kabete, Rudolph Lake.

Counties. KB, NB, MS.

Distribution. Central, East, Southern Africa, Yemen.

******Isoxya nigromutica* **(di Caporiacco, 1939)** (♀)

Gasteracantha n. di Caporiacco, 1939: 348; *I. n.*: Benoit 1962: 66.

Record. Moyale.
County. MS.
Distribution. Known from the type locality.

Isoxya tabulata **(Thorell, 1859)**

Gasteracantha t.: Pocock, 1898c: 516; *I. t.*: Benoit 1962: 36.

Records. Lake Victoria, Mombasa, Taru Desert, Tsavo River.
Counties. HB, KJ, MM, TT.
Distribution. Africa.

Isoxya testudinaria **(Simon, 1901)**

Gasteracantha (*I.*) *t.*: di Caporiacco, 1949: 425.

Record. Kabete.
County. KB.
Distribution. West, Central, East Africa.

Kilima decens **(Blackwall, 1866)**

Larinia d.: di Caporiacco, 1949: 412; *K. d.*: Grasshoff 1970: 122.

Records. Elmenteita, Mount Loroghi.
Counties. NK, SB.
Distribution. Africa.

Kilima griseovariegata **(Tullgren, 1910)**

Larinia simillima: di Caporiacco, 1949: 412; *Larinia g.*: di Caporiacco, 1949: 412.

Record. Nairobi.
County. NB.
Distribution. Central, East Africa, Yemen.

Larinia trifida **Tullgren, 1910**

L. t.: di Caporiacco 1949: 412.

Records. Mau, Nairobi.
County. NB.
Distribution. Central, East Africa.

Lipocrea longissima **(Simon, 1881)**

Larinia tibelloides: di Caporiacco, 1949: 412.

Record. Nairobi.
County. NB.
Distribution. Central, East, Southern Africa.

Neoscona alberti **(Strand, 1913)**

N. tuckeri: di Caporiacco, 1949: 416; *N. a.*: di Caporiacco 1949: 418; Grasshoff 1986: 51.

Record. Mau.
County. NB.
Distribution. Central, East, Southern Africa.

Neoscona angulatula **(Schenkel, 1937)**

N. a.: Grasshoff 1986: 106.

Records. Diani Beach, Mpala Ranch.
Counties. KW, LK.
Distribution. Kenya, Seychelles, Madagascar.

Neoscona blondeli **(Simon, 1886)**

Araneus bettoni: Pocock, 1898c: 510; *Araneus taruensis*: Pocock, 1898c: 511; *Araneus gerhardti*: di Caporiacco, 1949: 420; *N. b.*: Grasshoff 1986: 36.

Records. Elmenteita, Mombasa, Diani Beach, Taru Desert.
Counties. KJ, KW, MM, NK.
Distribution. Africa.

Neoscona chiarinii **(Pavesi, 1883)**

N. c.: Grasshoff 1986: 42.

Records. Naro Moru, Lake Nakuru, Nairobi, Karura Forest.

Counties. NB, NI, NK.
Distribution. Africa.

***Neoscona moreli* (Vinson, 1863)**

N. m.: Grasshoff 1986: 57.

Records. Mount Kenya, Naro Moru track.
County. NI.
Distribution. Africa, Caribbean to Argentina.

***Neoscona nautica* (L. Koch, 1875)**

Araneus nauticus: Pocock, 1898c: 509.

Records. Taru.
County. KJ.
Distribution. Asia and Pacific islands. Introduced to both Americas, Sudan and Kenya.

***Neoscona quadrigibbosa* Grasshoff, 1986**

N. q. Grasshoff, 1986: 112.

Records. West Pokot, Koduch.
County. WP.
Distribution. Central, East, Southern Africa.

***Neoscona quincasea* Roberts, 1983**

Neoscona (*Neoscona*) *quincasea*: Grasshoff, 1986: 24.

Records. Nairobi.
County. NB.
Distribution. East, Central, Southern Africa, Seychelles (Aldabra).

***Neoscona rapta* (Thorell, 1899)**

N. r.: Grasshoff 1986: 100.

Record. Diani Beach.
County. KW.
Distribution. Africa.

***Neoscona subfusca* (C.L. Koch, 1837)**

N. immodesta: di Caporiacco, 1941; *Araneus tullgreni tullgreni*: di Caporiacco, 1949: 419; *A. tullgreni obscuratus*: di Caporiacco, 1949: 419; *N. artifex artifex*: di Caporiacco, 1949: 415; *N. nigrita*: di Caporiacco, 1949: 418; *N. restiaria*: di Caporiacco, 1949: 415; *N. wiehlei* di Caporiacco, 1949: 414; *N. submodesta neumanni* di Caporiacco 1949: 416; *N. dauensis* (lapsus for *danensis*): di Caporiacco, 1949: 416; *N. s.* Grasshoff 1986: 15.

Records. Elolo, Mau, Kabete, Kajiado, Mount Kenya, Machakos, Meru, Mombasa, Nairobi, Turkana, Watamu.

Counties. KJ, KL, MC, ME, MM, MS, NA, NB, NI, TU.

Distribution. West Palearctic, Africa.

***Neoscona theisi theisiella* (Tullgren, 1910)**

N. theisiella: di Caporiacco, 1939: 341.

Record. Moyale.

County. MS.

Distribution. West, Central, East Africa, Yemen.

***Neoscona trianguta* (Keyserling, 1864)**

Epeira melanopa Gerstaecker, 1873: 493; *N. cruciferoides*: di Caporiacco, 1949: 84; *N. t.*: Grasshoff 1986: 84.

Records. Mau, Nairobi, Diani Beach, Mombasa, Turkana, Vanga, Maktau.

Counties. KW, NA, NB, MM, TT, TU.

Distribution. Africa, India.

***Neoscona vigilans* (Blackwall, 1865)**

N. irritans: di Caporiacco, 1947: 170; *N. v.*: Grasshoff 1986: 95.

Record. Gedi.

County. KL.

Distribution. Africa, South Asia.

***Nephila turneri* Blackwall, 1833**

N. femoralis: di Caporiacco, 1940: 819.

Records. No precise records, Kenia (sub. Chenia) was mentioned in distribution only.
County. K.
Distribution. West and Central Africa according to WSC (2018).
Note. The record most likely refers to another species, as *N. turneri* is not known in Eastern Africa.

Nephilingis cruentata **(Fabricius, 1775)**

Nephillingys genualis: Gerstaecker, 1873: 503; *Nephilengys c. c.*: Dahl, 1912: 77; di Caporiacco 1949: 404; *N. c.*: Kuntner et al. 2013: Appendix A.

Records. Kibwezi, Mombasa, Wangi, Tsavo Park.
Counties. MM, TT.
Distribution. Tropical Africa, South America (introduced).

Pararaneus cyrtoscapus **(Pocock, 1898)**

P. striatellus striatellus: di Caporiacco, 1949: 411.

Record. Nairobi.
County. NB.
Distribution. Central, East, Southern Africa, Socotra.
Note. It was identified by di Caporiacco (1949), based on a juvenile and may refer to *P. spectator*, because adults of this species were found in the same locality (Nairobi).

Pararaneus spectator **(Karsch, 1885)**

P. striatellus: di Caporiacco, 1949: 411; ?*Araneus similis*: Pocock, 1898c: 509; *P. striatellus similis*: di Caporiacco, 1949: 411; *P. streptoceros*: di Caporiacco, 1949: 411; *P. paracymbifer*: di Caporiacco, 1949: 411.

Records. Kabete, Changamwe, Mackinnon Road, Mau, Nairobi, Taru.
Counties. KB, KJ, KW, MM, NB.
Distribution. Africa, Middle East.

****Poltys corticosus*** **Pocock, 1898** (♀)

P. c. Pocock 1898c: 513.

Record. Maziwa Mitatu in Taru Desert.
County. KJ.
Distribution. Known only from the type locality.

Prasonica nigrotaeniata (Simon, 1909)

Mangora n. Simon, 1909: 40; *P. n.*: Grasshoff 1971: 305.

Record. Mount Loroghi.
County. SB.
Distribution. Africa.

Pycnacantha tribulus (Fabricius, 1781) (♀)

P. t.: di Caporiacco 1949: 424.

Record. Nairobi.
County. NB.
Distribution. Central, East, South Africa.

Trichonephila fenestrata venusta (Blackwall, 1865)

Nephila obsoleta: Gerstaecker, 1873: 498; *N.* (*Dasynephila*) *f. v.*: di Caporiacco, 1949: 404.

Records. Elmenteita, Kabete, Nairobi, Taveta.
Counties. KB, NB, NK, TT.
Distribution. East, West, Central Africa.

Trichonephila inaurata madagascariensis (Vinson, 1863)

Nephila argyrotoxa: Gerstaecker, 1873: 502; *Nephila madagascariensis*: Pocock, 1898c: 508.

Records. Mombasa, Taru Desert (Maziwa Mitatu).
Counties. KJ, MM.
Distribution. South Africa to Seychelles, Kenya.

Trichonephila senegalensis keyserlingi (Blackwall, 1865)

Nephila hymenaea: Gerstaecker, 1873: 497.

Record. Taveta.
County. TT.
Distribution. DR Congo, East Africa.

Trichonephila sumptuosa (Gerstaecker, 1873)

Nephila amoenula Gerstaecker, 1873: 500; *Nephila sumptuosa* Gerstaecker, 1873: 501; *N. s.*: Pocock 1898c: 508.

Records. Bura, Mombasa, Taru Desert (Mgana).
Counties. KJ, MM, TT.
Distribution. East Africa, Yemen (Socotra).

Atypidae Thorell, 1870

Calommata simoni Pocock, 1903

C. s.: Fourie et al. 2011: 14.

Record. Kakamega.
County. KK.
Distribution. Cameroon; DR Congo, Côte D'Ivoire, Guinée, Kenya, Liberia, Tanzania.

Barychelidae Simon, 1889

Pisenor notius Simon, 1889

P. n.: Benoit 1966: 230.

Records. Samburu, Taru, Lake Turkana.
Counties. SB, MM, TU.
Distribution. Ethiopia to Zimbabwe.

Caponiidae Simon, 1890

^*Caponia abyssinica* Strand, 1908 (♀)

C. a.: di Caporiacco 1939: 314.

Record. Moyale.
County. MS.
Distribution. Ethiopia, Kenya.
Note. Record from Kenya is not reflected in WSC (2018) which notes this species as distributed only within Ethiopia.

Cheiracanthiidae Wagner, 1887

Cheiracanthium africanum de Lessert, 1921

C. franganilloi di Caporiacco, 1949: 438; *C. a.*: di Caporiacco 1949: 433; Lotz 2007a: 10.

Records. Nairobi, Mpala Ranch, Naivasha, Machakos, Kabete.
Counties. KB, LK, NB, NK, MC.
Distribution. Africa (mainland), Madagascar, Réunion.

^*Cheiracanthium agnosticum* Strand, 1906

C. a.: di Caporiacco 1949: 433.

Record. Nairobi.
County. NB.
Distribution. Ethiopia, Kenya.
Note. The record was based on juvenile specimen. di Caporiacco (1949) was not sure if his identification was correct. Considered as *nomen dubium* by Lotz (2007a).

Cheiracanthium furculatum Karsch, 1879

C. hoggi: di Caporiacco, 1949: 433; *C. f.*: Lotz 2007a: 21.

Records. Athi River, Machakos, Nairobi, Olorgesailie.
Counties. KJ, MC, NB.
Distribution. Cape Verde Is., Africa, Madagascar, Comoros.

**Cheiracanthium kakamega* Lotz, 2015 (♂)

C. k. Lotz 2015: 326.

Record. Kakamega Forest.
County. KK.
Distribution. Known only from the type locality.

Cheiracanthium kenyaense Lotz, 2007

C. kenyaensis Lotz, 2007b: 162.

Record. Amboseli National Park.
County. KJ.
Distribution. Africa.

***Cheiracanthium kibonotense* de Lessert, 1921**

C. mauense: di Caporiacco, 1949: 433; *C. k.*: Lotz 2007a: 37.

Records. Mau Forest, Aberdare Mountains.
County. NA.
Distribution. Ethiopia, DR Congo, Kenya, Tanzania, Uganda.

***Cheiracanthium ludovici* de Lessert, 1921**

C. l.: Lotz 2007a: 43.

Record. Nairobi.
County. NB.
Distribution. DR Congo, Kenya, Tanzania, Madagascar.

***Cheiracanthium molle* L. Koch, 1875**

C. nairobii: di Caporiacco, 1949: 435; *C. m.*: di Caporiacco 1949: 433; Lotz 2007a: 45.

Records. Nairobi, Athi River, Karen.
Counties. MC, NB.
Distribution. Africa, Saudi Arabia.

^*Cheiracanthium pallicolor* Strand, 1906

C. p.: di Caporiacco 1949: 433.

Record. Nairobi.
County. NB.
Distribution. Ethiopia, Kenya.
Note. Identification based on subadult male and considered as *nomen dubium* by Lotz (2007a).

***Cheiracanthium punctipedellum* di Caporiacco, 1949**

C. p. di Caporiacco 1949: 437; Lotz 2007a: 52.

Record. Mau Range.
County. NA.
Distribution. DR Congo, Rwanda, Kenya.

***Cheiracanthium schenkeli* di Caporiacco, 1949**

C. s. di Caporiacco 1949: 436; Lotz 2007a: 56.

Record. Nairobi.
County. NB.
Distribution. Kenya, Rwanda, Zimbabwe, Botswana, South Africa.

***Cheiracanthium shilabira* Lotz, 2015**

C. s. Lotz 2015: 332.

Record. Kakamega Forest.
County. KK.
Distribution. DR Congo, Kenya.

****Cheiracanthium tetragnathoide* di Caporiacco, 1949**

C. t. di Caporiacco 1949: 438; Lotz 2007a: 60.

Record. Mau Range.
County. NA.
Distribution. Known only from the type locality.

***Cheiramiona ruwenzoricola* (Strand, 1916)**

Chiracanthium r.: di Caporiacco, 1949: 433.

Record. Nairobi.
County. NB.
Distribution. DR Congo, Kenya.
Note. Identified based on a juvenile specimen.

Cithaeronidae Simon,1893

^*Cithaeron delimbatus* Strand, 1906

C. d.: Platnick 1991: 8.

Records. Baringo, Kora National Reserve.
County. BR, TR.
Distribution. Ethiopia, Kenya, Somalia, Tanzania.

Clubionidae Wagner, 1887

^*Clubiona abbajensis kibonotensis* de Lessert, 1921

C. a. k.: Denis 1950: 497.

Record. Ridge Teleki.
County. NY.
Distribution. Kenya, Tanzania.

^*Clubiona abbajensis maxima* Strand, 1906

C. a. m.: di Caporiacco 1949: 432.

Record. Mau.
County. NA.
Distribution. Ethiopia, East Africa.

^*Clubiona africana* de Lessert, 1921

C. a.: Warui et al. 2004: 18.

Record. Eldoret.
County. UG.
Distribution. Kenya, Tanzania.

^*Clubiona latitans* Pavesi, 1883 (♂)

C. l.: di Caporiacco 1949: 432.

Record. Mau.
County. NA.
Distribution. Ethiopia, Somalia, Kenya.

^*Clubiona sjostedti* de Lessert, 1921

C. s.: di Caporiacco 1949: 432.

Record. Mau Range.
County. NA.
Distribution. Kenya, Tanzania.

Corinnidae Karsch, 1880

***Apochinomma formicaeforme* Pavesi, 1881**

A. f.: Haddad 2013b: 2505.

Record. Kakamega Forest.
County. KK.
Distribution. Africa.

****Brachyphaea simpliciaculeata* di Caporiacco, 1949 (♂)**

B. s. di Caporiacco 1949: 444.

Record. Elmenteita.
County. NK.
Distribution. Known only from the type locality.

^*Brachyphaea simoni* Simon, 1895

B. s.: Berland 1922: 70.

Records. Mount Loroghi, Mount Nyiro.
County. SB.
Distribution. Kenya, Tanzania.

***Cambalida fulvipes* (Simon, 1896)**

Castianeira mestrali: di Caporiacco, 1949: 445; *C. f.*: Warui et al. 2004: 18; Haddad 2012: 97.

Records. Amboseli National Park, Homa Bay Farmers Training Centre, Mount Kasigau, Jora Village, Nairobi, Garden at Muthaiga, Ngaia Forest, Kakamega Forest.
Counties. HB, KJ, KK, NB, ME, TT.
Distribution. Africa.

****Castianeira albomaculata* Berland, 1922 (♂)**

Castaneira a. Berland, 1922: 69.

Record. Voi.
County. TT.
Distribution. Known only from the type locality.

**Castianeira fusconigra* Berland, 1922 (♀)

Castaneira f. Berland, 1922: 68; di Caporiacco 1949: 445.

Records. Mouny Nyiro (type locality), Nairobi.
Counties. NB, SB.
Distribution. Kenya.

Copa flavoplumosa Simon, 1886

C. f.: Haddad 2013a: 8.

Records. Kakamega Forest, Mathew Range Forest, Mount Kasigau, Ngaia Forest, Marich Pass Field Studies Centre.
Counties. KK, LK, ME, TT, WP.
Distribution. Africa.

**Copuetta kakamega* Haddad, 2013 (♀)

C. k. Haddad 2013b: 36.

Records. Kakamega Forest.
County. KK.
Distribution. Known only from the type locality.

Copuetta lacustris (Strand, 1916)

Copa lacustris Strand, 1916b: 94; *C. l.*: Haddad 2013b: 39.

Records. Homa Bay Farmers Training Centre, Amboseli National Park, Mpala Research Station.
Counties. HB, KJ, LK.
Distribution. Africa.

**Corinna major* Berland, 1922

C. m. Berland 1922: 72.

Records. Mount Loroghi, Mount Nyiro.
County. SB.
Distribution. Known only from the type locality.

Echinax longespina (Simon, 1910)

Copa longespina Simon, 1910: 370; *E. l.*: Haddad 2012: 45.

Records. Kakamega Forest.
County. KK.
Distribution. West, Central, East Africa.

Echinax spatulata Haddad, 2012

E. s. Haddad 2012: 56.

Record. Kakamega Forest.
County. KK.
Distribution. West, Central, East Africa.

Graptartia granulosa Simon, 1896

G. g.: Berland 1922: 72; di Caporiacco 1949: 445; Haddad 2004: 72.

Records. Mackinnon Road, Mount Loroghi, 24 km SW of Nairobi.
Counties. NB, KW, SB.
Distribution. Africa.

Medmassa semiaurantiaca Simon, 1910

M. hiekae: di Caporiacco, 1949: 443; *M. s.*: Haddad and Bosselaers 2010: 3.

Records. Kakamega Forest, Marich Pass, Nairobi.
Counties. KK, NB, WP.
Distribution. Africa.

Ctenidae Keyserling, 1877

Afroneutria erythrochelis (Simon, 1876)

Phoneutria e. Simon, 1876: 222; *Ctenus carsoni* F.O. Pickard-Cambridge, 1898b: 24.

Records. Mombasa, Lake Victoria.
Counties. HB, MM.
Distribution. West, Central, East Africa.

^*Afroneutria immortalis* (des Arts, 1912)

Ctenus i.: di Caporiacco 1949: 446; *A. i.*: Polotow and Jocqué 2015: 8.

Records. Kibwezi, Arabuko sokoke, Nairobi, Taita, Watamu, Tsavo, Murera.
Counties. KB, KL, MK, NB, TT.
Distribution. Kenya, Tanzania.

***Anahita mamma* Karsch, 1884**

A. debilis: di Caporiacco, 1939: 357; *A. cambridgei*: di Caporiacco, 1949; *A. m.*: Benoit 1977a: 373.

Records. Mount Elgon, Mau, Moyale.
Counties. MS, NA, TZ.
Distribution. West, Central, East Africa.

***Arctenus taitensis* Polotow & Jocqué, 2014**

A. t. Polotow and Jocqué 2014: 243.

Records. Taita Hills.
County. TT.
Distribution. Known only from the type locality.

^*Ctenus amanensis* Strand, 1907 (♀)

C. a.: Benoit 1977b: 703.

Record. Mombasa.
County. MM.
Distribution. East Africa.

^*Ctenus colonicus* des Arts, 1912

C. c.: Benoit 1977c: 1029.

Record. Timbora (Timboroa?), Eldama Ravine.
Counties. BR, UG.
Distribution. East Africa.

****Ctenus elgonensis* Benoit, 1978**

C. e. Benoit 1978a: 529.

Record. Mount Elgon.
County. TZ.
Distribution. Known only from the type locality.

Ctenus holmi* **Benoit, 1978

C. h. Benoit 1978a: 531.

Records. 11 km N of Mombasa (type locality), Shimba Hills, Taita Hills.
Counties. KW, MM, TT.
Distribution. Kenya.

Ctenus kenyamontanus* **Benoit, 1978

C. k. Benoit 1978a: 526.

Record. Mount Kenya.
County. TN.
Distribution. Known only from the type locality.

^*Ctenus modestus* Simon, 1897

C. littorinus: Benoit, 1978a: 532.

Record. Diani Beach.
County. KW.
Distribution. Kenya, Tanzania.

Ctenus noctuabundus* **des Arts, 1912 (♀)

C. n. des Arts 1912: 209; Benoit 1979: 436.

Record. Kikuyu.
County. KB.
Distribution. Known only from the type locality.

Cyatholipidae Simon, 1894

Buibui claviger* **Griswold, 2001

B. c. Griswold 2001: 49.

Record. Mount Kenya.

County. LK.
Distribution. Known only from the type locality.

^*Pembatatu embamba* Griswold, 2001

P. e. Griswold 2001: 70.

Records. Aberdare Range, Cherangany Hills, Timboroa Forest.
Counties. NA, TZ, UG.
Distribution. Kenya, Tanzania.

**Pembatatu gongo* Griswold, 2001

P. g. Griswold 2001: 71.

Record. Mount Kenya.
County. LK.
Distribution. Known only from the type locality.

**Pembatatu mafuta* Griswold, 2001

P. m. Griswold 2001: 73.

Record. Mount Kenya.
County. TZ.
Distribution. Known only from the type locality.

**Scharffia holmi* Griswold, 1997

S. h. Griswold 1997: 277; Griswold 2001: 78.

Record. Mount Elgon.
County. TT.
Distribution. Known only from the type locality.

Cyrtaucheniidae Simon, 1889

^*Ancylotrypa atra* Strand, 1906 (♂)

A. a.: di Caporiacco 1949: 318.

Record. Mackinnon Road.
County. KW.

Distribution. Ethiopia, Kenya.

Note. di Caporiacco reported female of *A. flaviceps* (known by ♀) and male of *A. atra* (known by ♂ only) from the same locality. So, it is very likely that names are synonyms.

**Ancylotrypa fasciata* Fage, 1936 (♀)

A. f. Fage in Fage and Simon 1936: 310.

Records. Mount Elgon (type locality), Mau Range.

Counties. NA, TZ.

Distribution. Kenya.

**Ancylotrypa flaviceps* (Pocock, 1898) (♀)

Cyrtauchenius f. Pocock, 1898c: 506; *Pelmatorycter f.* Simon, 1903b: 898; *A. f.*: di Caporiacco 1949: 318.

Records. Mackinnon Road, Voi (type locality).

Counties. KW, TT.

Distribution. Kenya.

Deinopidae C. L. Koch, 1850

**Menneus samperi* Coddington, Kuntner & Opell, 2012

M. s. Coddington et al. 2012: 18.

Records. Kaibos.

County. WP.

Distribution. Known only from the type locality.

Dictynidae O. Pickard-Cambridge, 1871

Archaeodictyna condocta (O. Pickard-Cambridge, 1876)

Dictyna montana: di Caporiacco, 1949: 324.

Records. Nairobi.

County. NB.

Distribution. East, North Africa, Kazakhstan (possibly misidentified in Kazakhstan).

Dictyna tullgreni* di Caporiacco, 1949 (♂)

D. t. di Caporiacco 1949: 324.

Record. Mau Range.
County. NA.
Distribution. Known only from the type locality.

Nigma longipes* (Berland, 1914)

Dictyna l. Berland, 1914: 55; di Caporiacco 1949: 325.

Records. Mount Kenya (type locality), Mau Range, Naivasha.
Counties. NA, NI, NK.
Distribution. Kenya.

Dipluridae Simon, 1889

Thelechoris striatipes (Simon, 1889)

T. s.: Coyle 1995: 117.

Records. Tsavo West National Park, Shimba Hills, nr. North Kilifi, Jimba, Kibwezi, 48 km NE of Magadi, Mariakani, Shelly Beach Road, Sabaki River, 14 km E of Taveta, Wangi.
Counties. KJ, KL, KS, KW, MC, MK, MM, TT.
Distribution. East, Southern Africa, Madagascar.

Eresidae C. L. Koch, 1845

Dresserus fuscus Simon, 1876

D. f.: di Caporiacco 1949: 322.

Records. Elmenteita, Nairobi.
Counties. NB, NK.
Distribution. East Africa, Zanzibar.

^*Dresserus elongatus* Tullgren, 1910 (♀)

D. e.: di Caporiacco 1949: 322.

Records. Nairobi, Olgasailie.
County. NB.
Distribution. Kenya, Tanzania.

***Stegodyphus africanus* (Blackwall, 1866)**

S. a.: di Caporiacco 1949: 322.

Record. Elmenteita.
County. NK.
Distribution. Africa.

******Stegodyphus bettoni* Pocock, 1898**

S. b. Pocock 1898c: 517c.

Record. Samburu.
County. SB.
Distribution. Known only from the type locality.
Note. Described from a juvenile and therefore considered as *nomen dubium* (WSC 2018).

***Stegodyphus hildebrandti* (Karsch, 1878)**

S. h.: Kraus and Kraus 1989: 190.

Records. Malindi, Mbuyuni, Samburu.
Counties. KL, MM, SB.
Distribution. Central, East Africa, Zanzibar.

^*Stegodyphus lineifrons* Pocock, 1898 (♀)

S. l.: Kraus and Kraus 1989: 193.

Records. Malindi, Mbuyuni, Samburu.
Counties. KL, MM, SB.
Distribution. Kenya, Tanzania.

***Stegodyphus mimosarum* Pavesi, 1883**

S. m.: di Caporiacco 1949: 323; Kraus and Kraus 1989: 198.

Records. Mackinnon Road, Nairobi National park, Nakuru, Masai Mara, Samburu.
Counties. KW, NB, NK, NR, SB.
Distribution. Africa.

Stegodyphus sabulosus Tullgren, 1910 (♀)

S. s.: Kraus and Kraus 1989: 192.

Records. River Molo, Makueni, Mau Escarpment.
Counties. NA, NK, MK.
Distribution. East, Southern Africa.

Gnaphosidae Pocock, 1898

**Aphantaulax voiensis* Berland, 1920 (♀)

A. v. Berland 1920b: 106; *A. vojensis*: di Caporiacco, 1940: 834.

Records. Taita (type locality), Likoni.
Counties. MM, TT.
Distribution. Kenya.

Camillina cordifera (Tullgren, 1910)

C. c.: Berland 1920b: 107; Platnick and Murphy 1987: 4.

Records. Kilifi, Kaibos Farm, Likoni, Kipsigis Farm, Lake Naivasha, Kitale Forest, Lake Nakuru, Talau Hill, Nairobi.
Counties. KL, MM, NB, NK, TZ, UG.
Distribution. Africa.

Camillina kaibos Platnick & Murphy, 1987

C. k. Platnick and Murphy 1987: 12.

Record. Kaibos.
County. WP.
Distribution. Ivory Coast, Kenya.

Camillina pavesii (Simon, 1897)

C. p.: Platnick and Murphy 1987: 6.

Records. Nairobi, Naivasha, Japata Estate, Kacheliba, Mtembur, Suam River.
Counties. NB, NK, TZ, WP.
Distribution. Africa.

**Drassodes braendegaardi* di Caporiacco, 1949 (♂)

D. b. di Caporiacco 1949: 427.

Record. Elmenteita.
County. NK.
Distribution. Known only from the type locality.

^Drassodes kibonotensis Tullgren, 1910 (♀)

D. k.: di Caporiacco 1949: 428.

Record. Nairobi.
County. NB.
Distribution. Kenya, Tanzania.

^Echemella pavesii (Simon, 1909) (♀)

Allodrassus p.: di Caporiacco, 1949: 428.

Record. Nairobi.
County. NB.
Distribution. Ethiopia, Kenya.

**Megamyrmaekion nairobii* Berland, 1920 (♂)

Megamyrmeceon n. Berland, 1920b: 103.

Record. Nairobi.
County. NB.
Distribution. Known only from the type locality.

^Nomisia chordivulvata (Strand, 1906) (♀)

N. c.: di Caporiacco 1949: 432.

Record. Mackinnon Road.
County. KW.
Distribution. Ethiopia, Kenya, Somalia.

**Scotophaeus affinis* di Caporiacco, 1949 (♀)

S. a. di Caporiacco 1949: 429.

Record. Mau Forest.
County. NA.
Distribution. Known only from the type locality.

Scotophaeus schenkeli* **di Caporiacco, 1949

S. s. di Caporiacco 1949: 428.

Record. Nairobi.
County. NB.
Distribution. Known only from the type locality.

Synaphosus kakamega* **Ovtsharenko, Levy & Platnick, 1994

S. k. Ovtsharenko et al. 1994: 26.

Record. Kakamega.
County. KK.
Distribution. Known only from the type locality.

^*Xerophaeus biplagiatus* Tullgren, 1910 (♀)

X. b.: Berland 1920b: 106.

Record. Nairobi.
County. NB.
Distribution. Kenya, Tanzania.

***Xerophaeus coruscus kibonotensis* Tullgren, 1910**

X. c.: Berland 1920b: 105.

Records. Naivasha, Kikuyu, Mau.
Counties. KB, NA, NK.
Distribution. Ethiopia, East Africa, Yemen.

Xerophaeus thomasi* **(di Caporiacco, 1949) (♂)

Zelotes t.: di Caporiacco, 1949: 430; *X. t.*: FitzPatrick 2007: 98.

Record. Elmenteita.
County. NK.
Distribution. Known only from the type locality.

***Zelotes fuligineus* (Purcell, 1907)**

Z. f.: FitzPatrick 2007:102.

Records. Chyulu Hills, Mount Kenya, Mount Suswa, Watamu.
Counties. KL, MK, NR, TN.
Distribution. Central, East, Southern Africa.

***Zelotes guineanus* (Simon, 1907)**

Prosthesima tristella: Berland, 1920b: 106; *Z. g.*: FitzPatrick 2007: 142.

Records. Kaibos, Kamatira, Kijabe, Kitale, Nairobi, Mau Escarpment.
Counties. KB, NA, NB, TZ, WP.
Distribution. West, Central, East Africa.

****Zelotes jocquei* FitzPatrick, 2007** (♀)

Z. j. FitzPatrick 2007: 140.

Record. Kitale.
County. TZ.
Distribution. Known only from the type locality.

****Zelotes kulempikus* FitzPatrick, 2007** (♂)

Z. k. FitzPatrick 2007: 143.

Record. Kwaisagat.
County. WP.
Distribution. Known only from the type locality.

***Zelotes laetus* (O. Pickard-Cambridge, 1872)**

Z. l.: FitzPatrick 2007: 108.

Records. Baringo, Chyulu Hills, Galana River, Isido (Isiolo?).
Counties. BR, IS, MC, MK.
Distribution. North Africa to Senegal and Kenya, Portugal, France, Israel, Saudi Arabia. Introduced to Hawaii, USA, Mexico and Peru.

^*Zelotes lutorius* (Tullgren, 1910) (♀)

Camillina l.: Berland, 1920b: 108.

Record. Mau.
County. NA.
Distribution. Kenya, Tanzania.

Zelotes murphyorum* **FitzPatrick, 2007

Z. m. FitzPatrick 2007: 132.

Records. Watamu (type locality), Gedi, Kilifi.
County. KL.
Distribution. Kenya.

Zelotes scrutatus **(O. Pickard-Cambridge, 1872)**

Z. s.: FitzPatrick 2007: 111.

Records. Kilifi, Kongelai, Lake Harrington, Mount Suswa, Mtembur, Nairobi, Naivasha, Namanga.
Counties. BR, KJ, KL, NB, NK, NR, WP.
Distribution. Canary Is., Africa to Central Asia.

Zelotes tuckeri **Roewer, 1951**

Z. t.: FitzPatrick 2007: 139.

Records. Cherangani, Chyulu Hills, Lake Harrington, Mtembur, Nairobi, Ruiru.
Counties. BR, KB, MK, NB, TZ, WP.
Distribution. East, Southern Africa.

Zelotibia kaibos* **Russell-Smith & Murphy, 2005 (♂)

Z. k. Russell-Smith and Murphy 2005: 108.

Record. Kaibos.
County. WP.
Distribution. Known only from the type locality.

Zelotibia simpula **Russell-Smith & Murphy, 2005**

Z. s. Russell-Smith and Murphy 2005: 107.

Record. Kakamega Forest.
County. KK.
Distribution. DR Congo, Kenya.

Hahniidae Bertkau, 1878

Hahnia benoiti Bosmans & Thijs, 1980

H. b. Bosmans and Thijs 1980: 564.

Record. Mount Kenya.
County. LK.
Distribution. Known only from the type locality.

Hahnia breviducta Bosmans & Thijs, 1980

H. b. Bosmans and Thijs 1980: 565.

Record. Mount Kenya.
County. LK.
Distribution. Known only from the type locality.

Hahnia inflata Benoit, 1978

H. i. Benoit 1978b: 619; Bosmans and Thijs 1980: 562.

Record. Mount Kenya.
County. LK.
Distribution. Known only from the type locality.

Hahnia major Benoit, 1978

H. m. Benoit, 1978b: 612; Bosmans and Thijs 1980: 560.

Record. Mount Kenya.
County. LK.
Distribution. Known only from the type locality.

Hahnia mauensis Bosmans, 1986 (♀)

H. m. Bosmans 1986: 346.

Records. Nairobi, Mau Range (type locality).
Counties. NA, NB.
Distribution. Kenya.

**Hahnia nigricans* Benoit, 1978 (♂)

H. n. Benoit 1978b: 615.

Record. Mount Kenya.
County. LK.
Distribution. Known only from the type locality.

Hahnia schubotzi Strand, 1913

H. rouleti rouleti: di Caporiacco, 1949: 332.

Record. Nairobi.
County. NB.
Distribution. Central, East Africa.

**Hahnia sirimoni* Benoit, 1978

H. s. Benoit 1978b: 617.

Record. Mount Kenya.
County. LK.
Distribution. Known only from the type locality.

**Hahnia spinata* Benoit, 1978

H. s.: Bosmans and Thijs 1980: 561.

Record. Mount Kenya.
County. LK.
Distribution. Known only from the type locality.

Hahnia tabulicola Simon, 1898

H. rouleti annulata: di Caporiacco, 1949: 332; *H. t.*: Bosmans and Thijs 1980: 567.

Records. Mount Kenya, Mau Escarpment, Nairobi.
Counties. LK, NA, NB.
Distribution. Africa.

**Hahnia vangoethemi* Benoit, 1978

H. v.: Bosmans and Thijs 1980: 562.

Record. Mount Kenya.
County. LK.
Distribution. Known only from the type locality.

Hersiliidae Thorell, 1870

^*Hersilia hildebrandti* Karsch, 1878 (♀)

H. h.: di Caporiacco 1949: 426.

Records. Mackinnon Road, Nairobi.
County. NB.
Distribution. Kenya, Tanzania.
Note. Record of this species most likely refers to *H. occidentalis*, a species known from Nairobi.

Hersilia occidentalis Simon, 1907

H. segregata: Benoit, 1967: 24; *H. o.*: Foord and Dippenaar-Schoeman 2006: 62.

Records. Shimba Hills Nature Reserve, Nairobi, Marich Pass Field Studies Centre.
Counties. KW, NB, WP.
Distribution. West, Central, East Africa.

Hersilia sagitta Foord & Dippenaar-Schoeman, 2006

H. s.: Foord 2008: 139.

Records. Shimba Hills National Reserve, Mount Kisigau.
Counties. KW, TT.
Distribution. Kenya, Malawi, Tanzania, South Africa.

**Hersilia scrupulosa* Foord & Dippenaar-Schoeman, 2006

H. s. Foord and Dippenaar-Schoeman 2006: 77; Foord 2008: 130.

Record. Taita Discovery Center.
County. TT.
Distribution. Known only from the type locality.

**Hersilia selempoi* Foord & Dippenaar-Schoeman, 2006

H. s. Foord and Dippenaar-Schoeman 2006: 51.

Records. Taita Discovery Center.
County. TT.
Distribution. Known only from the type locality.

***Hersilia sericea* Pocock, 1898**

H. s.: Foord and Dippenaar-Schoeman 2006: 66; Foord 2008: 125.

Records. Taita Discovery Center.
County. TT.
Distribution. East, Southern Africa.

*****Hersilia taita* Foord & Dippenaar-Schoeman, 2006 (♂)**

H. t. Foord and Dippenaar-Schoeman 2006: 27.

Record. Taita.
County. TT.
Distribution. Known only from the type locality.

Idiopidae Simon, 1889

*****Heligmomerus jeanneli* Berland, 1914 (♀)**

H. j. Berland 1914: 41; 1927: 25.

Record. Fort Hall.
County. KB.
Distribution. Known only from the type locality.

*****Idiops melloleitaoi* (di Caporiacco, 1949) (♀)**

Titanidiops m. di Caporiacco, 1949: 320.

Record. Mackinnon Road.
County. KW.
Distribution. Known only from the type locality.

*****Idiops robustus* (Pocock, 1898) (♀)**

Acanthodon r. Pocock, 1898c: 507; *I. r.* Roewer 1942: 154.

Record. Taru and Machuma in Taru Desert.

County. KJ.
Distribution. Known only from the type locality.

***_Titanidiops compactus_ (Gerstaecker, 1873) (♀)**

Idiops c. Gerstaecker, 1873: 483; *Idiops c.*: Simon, 1890b: 126.

Record. Taveta.
County. TT.
Distribution. Known only from the type locality.

Linyphiidae Blackwall, 1859

***_Aberdaria ligulata_ Holm, 1962 (♀)**

A. l. Holm 1962: 82.

Record. Aberdare.
County. NA.
Distribution. Known only from the type locality.

***_Afroneta elgonensis_ Merrett, 2004**

A. e. Merrett 2004: 4; *A. e.*: Frick and Scharff 2018: 13.

Record. Mount Elgon.
County. TZ.
Distribution. Known only from the type locality.

***_Afroneta flavescens_ Frick & Scharff, 2018**

A. f. Frick and Scharff 2018: 9.

Record. Mount Elgon.
County. TZ.
Distribution. Known only from the type locality.

***_Afroneta sarahae_ Frick & Scharff, 2018**

A. s. Frick and Scharff 2018: 20.

Record. Mount Elgon.
County. TZ.
Distribution. Known only from the type locality.

*__*Afroneta serrata*__* **Frick & Scharff, 2018**

A. s. Frick & Scharff, 2018: 16.

Record. Mount Elgon.
County. TZ.
Distribution. Known only from the type locality.

*__*Agyneta curvata*__* **(Bosmans, 1979)**

Meioneta c. Bosmans, 1979: 59.

Record. Mount Kenya.
County. TN.
Distribution. Known only from the type locality.

Agyneta gracilipes **(Holm, 1968)**

Meioneta gracilipes: Bosmans 1979: 55; Russell-Smith and Jocqué 1986: 450.

Records. Mount Kenya, City Park, Muthaiga.
Counties. NB, TN.
Distribution. Angola, Cameroon, Gabon, DR Congo, Kenya.

Agyneta habra **(Locket, 1968)**

Meioneta h.: Bosmans, 1979: 55; Russell-Smith and Jocqué 1986: 450.

Records. Mount Kenya, Muthaiga, Lake Naivasha, Nairobi National Museum, Nairobi City Park.
Counties. NB, NK, TN.
Distribution. Africa.

*__*Agyneta metropolis*__* **(Russell-Smith & Jocqué, 1986)**

Meioneta m. Russell-Smith and Jocqué 1986: 444.

Record. Nairobi.
County. NB.
Distribution. Known only from the type locality.

Agyneta prosectes **(Locket, 1968)**

Meioneta p.: Bosmans, 1979: 56; Russell-Smith and Jocqué 1986: 451.

Records. Mount Kenya, Muthaiga.
Counties. NB, TN.
Distribution. St. Helena, Africa.

Araeoncus gertschi* **di Caporiacco, 1949 (♀)

A. g. di Caporiacco, 1949: 371.

Record. Mau Forest.
County. NA.
Distribution. Known only from the type locality.

Araeoncus impolitus* **Holm, 1962 (♀)

A. i. Holm, 1962: 90.

Record. Aberdare Range.
County. NA.
Distribution. Known only from the type locality.

Araeoncus subniger* **Holm, 1962

A. s. Holm, 1962: 90; Jocqué 1985: 277.

Record. Mount Kenya.
County. NI.
Distribution. Known only from the type locality.

^*Araeoncus victorianyanzae* Berland, 1936

A. v. Berland, in Fage and Simon 1936: 326; *A. praeceps* Holm, 1962: 85.

Records. Kisumu, Mount Elgon, Mount Kenya.
Counties. KS, NI, TZ.
Distribution. Kenya, Tanzania.

Asthenargellus kastoni* **di Caporiacco, 1949

A. k. di Caporiacco, 1949: 366.

Record. Mau Range.
County. NA.
Distribution. Known only from the type locality.

******Asthenargellus meneghettii*** **di Caporiacco, 1949 (♀)**

A. m. di Caporiacco, 1949: 367.

Record. Mau Range.
County. NA.
Distribution. Known only from the type locality.

^*Asthenargus expallidus* **Holm, 1962**

A. e. Holm, 1962: 76.

Records. Mau Range, Aberdare Range, Campbell Cave, Cherangani Hills.
Counties. NA, NI, TZ.
Distribution. Kenya, Tanzania.

^*Asthenargus inermis* **Simon & Fage, 1922**

A. i. Simon and Fage 1922: 544; Fage and Simon 1936: 329.

Records. Marakwet, Mount Kenya.
Counties. EM, NI.
Distribution. Kenya, Tanzania.

******Asthenargus major*** **Holm, 1962**

A. m. Holm, 1962: 81.

Record. Mount Elgon.
County. TZ.
Distribution. Known only from the type locality.

Bursellia glabra **Holm, 1962**

B. g. Holm, 1962: 171; Russell-Smith and Jocqué 1986: 450.

Records. Ruiru, Mount Elgon, Mau Escarpment, Aberdare Montains.
Counties. KB, NA, TZ.
Distribution. Congo, Kenya.

******Bursellia holmi*** **Bosmans, 1977**

B. h. Bosmans, 1977: 463.

Record. Mount Kenya.
County. NI.
Distribution. Known only from the type locality.

***Bursellia setifera* (Denis, 1962)**

Minyriolus setifer Denis, 1962: 189; *B. s.*: Jocqué 1981: 485; Russell-Smith and Jocqué 1986: 450.

Record. Lake Naivasha.
County. NK.
Distribution. Cameroon, Congo, Kenya, Tanzania, Malawi.

***Callitrichia aliena* Holm, 1962**

C. a. Holm, 1962: 155; *Toschia digitata* Holm, 1962: 165.

Record. Mount Elgon.
County. TZ.
Distribution. Algeria, Cameroon, Kenya.

^*Callitrichia cacuminata* Holm, 1962

C. c. Holm, 1962: 127.

Record. Mount Elgon.
County. TZ.
Distribution. Kenya, Uganda.

^*Callitrichia glabriceps* Holm, 1962

C. g. Holm, 1962: 147.

Record. Mount Elgon.
County. TZ.
Distribution. Kenya, Uganda.

^*Callitrichia hamifera* Fage, 1936

C. hamifer Fage in Fage and Simon 1936: 330; Holm 1962: 149.

Record. Mount Elgon.
County. TZ.
Distribution. Kenya, Uganda.

****Callitrichia inacuminata* Bosmans, 1977**

C. i. Bosmans, 1977: 460.

Record. Mount Kenya.
County. NI.
Distribution. Known only from the type locality.

****Callitrichia kenyae* Fage, 1936**

C. k. Fage, in Fage and Simon 1936: 333; Holm 1962: 136.

Records. Mount Kenya (type locality), Aberdares, Mau Range.
Counties. NA, NI.
Distribution. Kenya.

****Callitrichia marakweti* Fage, 1936**

C. m. Fage in Fage and Simon 1936: 332.

Record. Marakwet.
County. EM.
Distribution. Known only from the type locality.

***Callitrichia silvatica* Holm, 1962**

C. s. Holm, 1962: 130.

Records. Mount Elgon, Mau Range, Ruiru.
Counties. KB, NA, TZ.
Distribution. Kenya, Uganda, Malawi.

***Ceratinopsis africana* (Holm, 1962)**

Entelecara a. Holm, 1962: 91; *Styloctetor africanus*: Bosmans, 1977: 456.

Record. Aberdare Range.
County. NA.
Distribution. Gabon, Kenya.

****Ceratinopsis raboeli* Scharff, 1989**

C. r. Scharff, 1989: 13.

Record. Lake Naivasha.
County. NK.
Distribution. Known only from the type locality.

Ceratocyba umbilicaris* **Holm, 1962

C. u. Holm, 1962: 63.

Record. Mount Elgon.
County. TZ.
Distribution. Known only from the type locality.

Chenisides monospina* **Russell-Smith & Jocqué, 1986

C. m. Russell-Smith and Jocqué 1986: 442.

Record. Muthaiga.
County. NB.
Distribution. Known only from the type locality.

Erigone prominens **Bösenberg & Strand, 1906**

E. p.: Russell-Smith and Jocqué 1986: 450.

Record. East of Naivasha.
County. NK.
Distribution. Asia. Introduced to Africa, Australia, New Zealand.

Erigone sirimonensis* **Bosmans, 1977 (♀)

E. s. Bosmans, 1977: 453.

Record. Sirimon track.
County. LK.
Distribution. Known only from the type locality.

Gonatium petrunkewitschi* **di Caporiacco, 1949 (♂)

G. p. di Caporiacco, 1949: 361.

Record. Nairobi.
County. NB.
Distribution. Known only from the type locality.

***Helsdingenia extensa* (Locket, 1968)**

H. e.: Saaristo and Tanasevitch 2003: 155.

Record. No precise records.
County. K.
Distribution. St. Helena, Africa, Madagascar, Comoros.

***Holmelgonia nemoralis* Holm, 1962**

Elgonella n. Holm, 1962: 168.

Record. Mount Elgon.
County. TZ.
Distribution. Congo, Uganda, Kenya.

******Improphantes falcatus* Bosmans, 1979**

Lepthyphantes f. Bosmans, 1979: 85; Russell-Smith and Jocqué 1986: 448.

Record. Mount Kenya.
County. LK.
Distribution. Known only from the type locality.

******Improphantes mauensis* di Caporiacco, 1949**

Lepthyphantes m. di Caporiacco, 1949: 356; Bosmans 1979: 88; Russell-Smith and Jocqué 1986: 452.

Records. Mau Range (type locality), Mount Kenya, East of Naivasha, Aberadare Range.
Counties. NA, NI, NK.
Distribution. Kenya.

***Laminafroneta bidentata* (Holm, 1968)**

Afroneta b. Holm, 1968: 34; Bosmans 1979: 54; *L. b.*: Merrett 2004: 24.

Records. Cherangany Hills, Mau Escarpment, Mount Kenya.
Counties. NA, NI, TZ.
Distribution. DR Congo, Kenya, Rwanda.

***Laminafroneta brevistyla* (Holm, 1968)**

Afroneta b.: Scharff 1989, 17; *L. b.*: Merrett 2004: 25.

Record. Mount Kenya.
County. TN.
Distribution. Cameroon, Congo, Kenya, Tanzania.

Lepthyphantes aberdarensis* **Russell-Smith & Jocqué, 1986 (♀)

L. a. Russell-Smith and Jocqué 1986: 446.

Records. Aberdare Range (type locality), Mount Kenya.
Counties. NA, NI.
Distribution. Kenya.

Lepthyphantes biseriatus biseriatus* **Simon & Fage, 1922

L. b. b. Simon and Fage 1922: 547; *L. salti*: Denis, 1950: 498.

Records. Campbell Cave (type locality), Mount Kenya, Timbora.
County. NI, UG.
Distribution. Kenya.

Lepthyphantes biseriatus infans* **Simon & Fage, 1922

L. b. i. Simon and Fage 1922: 548.

Record. Campbell Cave.
County. NI.
Distribution. Known only from the type locality.

Lepthyphantes coomansi* **Bosmans, 1979

L. c. Bosmans, 1979: 67.

Records. Mount Kenya (type locality), Aberdare Mountains.
Counties. NI, TN.
Distribution. Kenya.

Lepthyphantes kekenboschi* **Bosmans, 1979

L. k. Bosmans, 1979: 70.

Record. Mount Kenya.
County. TN.
Distribution. Known only from the type locality.

***Lepthyphantes kenyensis* **Bosmans, 1979**

L. k. Bosmans, 1979: 74.

Record. Mount Kenya.
County. TN.
Distribution. Known only from the type locality.

***Lepthyphantes locketi* van Helsdingen, 1977**

L. l. van Helsdingen, 1977: 172; Russell-Smith and Jocqué 1986: 451.

Records. National Museum, City Park, Muthaiga.
County. NB.
Distribution. Angola, Kenya.

***Lepthyphantes nigropictus* **Bosmans, 1979**

L. nigropicta Bosmans, 1979: 77.

Record. Mount Kenya.
County. NI.
Distribution. Known only from the type locality.

***Lepthyphantes obtusicornis* **Bosmans, 1979**

L. o. Bosmans, 1979: 81; Russell-Smith and Jocqué 1986: 451.

Records. Mount Kenya (type locality), Aberdare Range.
Counties. NA, NI.
Distribution. Kenya.

^*Lepthyphantes tropicalis* **Tullgren, 1910**

L. t.: di Caporiacco, 1949: 356.

Records. Mau Forest.
County. NA.
Distribution. Kenya, Tanzania.

***Limoneta sirimoni* (Bosmans, 1979)**

Lepthyphantes s. Bosmans, 1979: 92; Russell-Smith and Jocqué 1986: 452.

Record. Mount Kenya.
County. NI.
Distribution. Kenya, South Africa.

Locketidium couloni* **Jocqué, 1981

L. c. Jocqué, 1981: 562.

Record. Gedi Forest.
County. KL.
Distribution. Known only from the type locality.

Mecynidis bitumida* **Russell-Smith & Jocqué, 1986 (♀)

M. b. Russell-Smith and Jocqué 1986: 449.

Records. Muthaiga (type locality), Amboseli National Park, Ruiru, Lake Naivasha.
Counties. KB, KJ, NB, NK.
Distribution. Kenya.

Mecynidis muthaiga* **Russell-Smith & Jocqué, 1986

M. m. Russell-Smith and Jocqué 1986: 448; Scharff 1989: 15.

Record. Muthaiga.
County. NB.
Distribution. Known only from the type locality.

Metaleptyphantes clavator **Locket, 1968**

M. c.: Russell-Smith and Jocqué 1986: 451.

Records. City Park, Muthaiga, National Museum.
County. NB.
Distribution. DR Congo, Angola, Kenya, Tanzania.

Metaleptyphantes dentiferens* **Bosmans, 1979

M. d. Bosmans, 1979: 63.

Record. Mount Kenya.
County. NI.
Distribution. Known only from the type locality.

***Metaleptyphantes perexiguus* Simon & Fage, 1922**

Lepthyphantes p. Simon and Fage 1922: 545; *M. p.*: Russell-Smith and Jocqué 1986: 451.

Records. Gedi Forest, Shimoni, Nairobi National Museum.
Counties. Kl, NB.
Distribution. Africa, Comoros.

^*Microcyba angulata* Holm, 1962

M. a. Holm, 1962: 56.

Record. Mount Elgon.
County. TZ.
Distribution. Kenya, Uganda.

^*Microcyba hamata* Holm, 1962

M. h. Holm, 1962: 60.

Record. Mount Elgon.
County. TZ.
Distribution. Kenya, Uganda.

*****Microcyba simulata* Holm, 1962 (♀)**

M. s. Holm, 1962: 48.

Record. Aberdare Range.
County. NA.
Distribution. Known only from the type locality.

^*Microcyba tridentata* Holm, 1962

M. t. Holm, 1962: 58.

Record. Mount Elgon.
County. TZ.
Distribution. Kenya, Uganda.

*****Microcyba vancotthemi* Bosmans, 1977 (♀)**

M. v. Bosmans, 1977: 451.

Record. Mount Kenya.
County. NI.
Distribution. Known only from the type locality.

Microcyba viduata* **Holm, 1962 (♀)

M. v. Holm, 1962: 52.

Record. Aberdare Range.
County. NA.
Distribution. Known only from the type locality.

^*Microlinyphia aethiopica* (Tullgren, 1910)

Linyphia a.: di Caporiacco 1949: 353.

Records. Nairobi, Elmenteita.
Counties. NB, NK.
Distribution. Kenya, Tanzania.

***Microlinyphia sterilis* (Pavesi, 1883)**

Linyphia s.: di Caporiacco, 1949: 352; *Linyphia africanibia*: di Caporiacco 1949: 354; *Linyphia bonneti* di Caporiacco, 1949: 354; *Bonnetiella singularis* di Caporiacco, 1949: 359; *M. s.*: van Helsdingen 1969: 156; 1970: 17; Russell-Smith and Jocqué 1986: 452; Warui et al. 2004: 19.

Records. Nairobi, Mau Forest, Mount Kenya, Muthaiga, East of Naivasha, Aberdare Mountain, Nairobi National Museum, Mpala Ranch.
Counties. LK, NA, NB, NI, NK.
Distribution. Central, East, Southern Africa; China.

***Mioxena celisi* Holm, 1968**

M. c.: Russell-Smith and Jocqué 1986: 450.

Record. Lake Naivasha.
County. NK.
Distribution. Congo, Kenya.

^*Murphydium foliatum* Jocqué, 1996

M. f. Jocqué, 1996: 238.

Records. Kilifi, Watamu Garden and Beach, Gedi Jilore Forest, Mida Creek.
County. KL.
Distribution. Kenya, Somalia.

***Neriene conica* (Locket, 1968)**

N. c.: van Helsdingen 1969: 176; Russell-Smith and Jocqué 1986: 452.

Record. Nairobi.
County. NB.
Distribution. Angola, Rwanda, Kenya.

***Neriene helsdingeni* (Locket, 1968)**

N. h.: van Helsdingen 1969: 162.

Records. Karura Forest, Cherangany Hills, Muthaiga, City Park.
Counties. NB, TZ.
Distribution. Africa.

***Neriene kibonotensis* (Tullgren, 1910)**

Linyphia bonneti: di Caporiacco, 1949: 354; *N. k.*: van Helsdingen 1969: 156.

Records. Mau Range, Mount Elgon, Mount Kenya.
Counties. NA, NI, TZ.
Distribution. Africa.

***Neriene obtusa* (Locket, 1968)**

N. o.: van Helsdingen 1969: 118.

Record. Kakamega.
County. KK.
Distribution. Africa.

^*Oreocyba elgonensis* (Fage, 1936)

Rhaebothorax e. Fage, in Fage and Simon 1936: 328; *O. e.*: Holm 1962: 33.

Record. Mount Elgon.
County. TZ.
Distribution. Kenya, Uganda.

^*Oreocyba propinqua* Holm, 1962

O. p. Holm, 1962: 37.

Record. Mount Elgon.
County. TZ.
Distribution. Kenya, Uganda.

Ostearius melanopygius (O. Pickard-Cambridge, 1880)

Haemathyphantes denisi di Caporiacco, 1949: 360.

Record. Nairobi.
County. NB.
Distribution. Cosmopolitan.

**Pelecopsis albifrons* Holm, 1979

P. a. Holm, 1979: 267.

Record. Mount Kenya.
County. TN.
Distribution. Known only from the type locality.

**Pelecopsis alticola alticola* (Berland, 1936)

Lophocarenum a. Berland, in Fage and Simon 1936: 322; *Trichopterna a.*: Holm, 1962: 94; *P. a. a.*: Holm 1979: 268.

Records. Kinangop, Aberdare Range (type locality), Mount Kenya, Kirimeri Forest.
Counties. EM, NA, NI.
Distribution. Kenya.

**Pelecopsis alticola kenyensis* (Holm, 1962)

Trichopterna a. k. Holm, 1962: 97; *P. a. k.*: Holm 1979: 263.

Record. Mount Kenya.
County. NI.
Distribution. Known only from the type locality.

**Pelecopsis humiliceps* Holm, 1979

P. h. Holm, 1979: 265; Russell-Smith and Jocqué 1986: 450.

Records. Mount Elgon (type locality), Mount Kenya, Kitale Forest, Nairobi.
Counties. NB, NI, TZ.
Distribution. Kenya.

^*Pelecopsis nigriceps* Holm, 1962

P. n. Holm, 1962: 116; 1979: 269.

Record. Mount Elgon.
County. TZ.
Distribution. Kenya, Uganda.

***Pelecopsis physeter* (Fage, 1936)**

Lophocarenum p. Fage, in Fage and Simon 1936: 324; *Trichopterna p.*: Holm, 1962: 106.

Records. Cherangany Marakwet, Kitale, Mount Elgon.
Counties. EM, TZ.
Distribution. Congo, Rwanda, Kenya, Tanzania.

^*Pelecopsis reclinata* (Holm, 1962)

Trichopterna r. Holm, 1962: 108.

Record. Mount Elgon.
County. TZ.
Distribution. Kenya, Uganda.

Pelecopsis subflava* **Russell-Smith & Jocqué, 1986

P. s. Russell-Smith and Jocqué 1986: 440.

Records. Muthaiga (type locality), Lake Naivasha.
Counties. NB, NK.
Distribution. Kenya.

Pelecopsis tybaertielloides* **Jocqué, 1984 (♂)

P. t. Jocqué, 1984: 225.

Record. Kitale.
County. TZ.
Distribution. Known only from the type locality.

^*Pelecopsis varians* (Holm, 1962)

Trichopterna v. Holm, 1962: 104; *P. v.*: Russell-Smith and Jocqué 1986: 450.

Records. Mount Elgon, Lake Naivasha.
Counties. NK, TZ.
Distribution. Kenya, Uganda.

***Prinerigone aethiopica* (Tullgren, 1910)**

Erigone afroalpina Holm, 1962: 73; *Erigone a.*: Bosmans and Jocqué 1983: 591; *P. a.*: Russell-Smith and Jocqué 1986:450.

Records. Sirimon Valley, Naro Moru, Ontulili Valley.
Counties. LK, NI.
Distribution. Cameroon, Kenya, Tanzania.

****Strongyliceps alluaudi* Fage, 1936**

S. a. Fage, in Fage and Simon 1936: 320; Holm 1962: 66.

Record. Mount Elgon.
County. TZ.
Distribution. Known only from the type locality.

^*Strongyliceps anderseni* Holm, 1962

S. a. Holm, 1962: 69.

Record. Mount Elgon.
County. TZ.
Distribution. Kenya, Uganda.

****Toschia aberdarensis* Holm, 1962**

T. a. Holm, 1962: 160.

Record. Aberdare Range.
County. NA.
Distribution. Known only from the type locality.

****Toschia concolor* di Caporiacco, 1949 (♀)**

T. c. di Caporiacco, 1949: 365.

Record. Mau Range.
County. NA.
Distribution. Known only from the type locality.

Toschia picta **di Caporiacco, 1949**

T. p. di Caporiacco, 1949: 363; *Rhaebothorax hadzji* di Caporiacco, 1949: 368; Holm 1962: 157.

Records. Mau Escarpment, Mount Kenya.
Counties. NA, NI.
Distribution. Congo, Kenya.

****Toschia telekii*** **Holm, 1962**

T. t. Holm, 1962: 163; Bosmans 1977: 463.

Record. Mount Kenya.
County. NI.
Distribution. Known only from the type locality.

****Trichoncus kenyensis*** **Thaler, 1974 (♂)**

T. k. Thaler, 1974: 265.

Record. Fort Jesus.
County. MM.
Distribution. Known only from the type locality.

****Trichoncus nairobi*** **Russell-Smith & Jocqué, 1986** (♀)

T. n. Russell-Smith and Jocqué 1986: 444.

Record. Nairobi City Park.
County. NB.
Distribution. Known only from the type locality.

Tybaertiella convexa **(Holm, 1962)**

Cnephalocotes convexus Holm, 1962: 123; *Cnephalocotes compar* Holm, 1962:124; *T. c.*: Jocqué 1984: 224.

Records. Mount Elgon, Cherangany Hills, Nakuru, Mount Kenya, Kitale, Lake Naivasha, Nairobi City Park, Muthaiga, Nairobi National Museum.

Counties. NB, NI, NK, TZ.
Distribution. West, Central, East Africa.

***Tybaertiella krugeri* (Simon, 1894)**

Lophocarenum bacelarae di Caporiacco, 1949: 372; *T. k.*: Jocqué 1984: 220.

Records. Mount Elgon, Nairobi, Kitale, Lake Naivasha, Mount Kenya, Endebess, Mathews Range Forest, Kakamega Forest.
Counties. KK, LK, NB, NI, NK, TZ.
Distribution. Africa.

******Venia kakamega* Seyfulina & Jocqué, 2009**

V. k. Seyfulina and Jocqué 2009: 4.

Record. Kakamega Forest.
County. KK.
Distribution. Known only from the type locality.

******Walckenaeria aberdarensis* (Holm, 1962)**

Tigellinus a. Holm, 1962: 181; *Tigellinus kenyensis* Bosmans, 1977: 467; *W. a.*: Holm 1984: 141.

Records. Aberdare Range (type locality), Mount Kenya.
Counties. NA, NI.
Distribution. Kenya.

^*Walckenaeria elgonensis* (Holm, 1984)

W. e. Holm, 1984: 147.

Record. Mount Elgon.
County. TZ.
Distribution. Kenya, Uganda.

******Walckenaeria kulalensis* (Holm, 1984) (♂)**

W. k. Holm, 1984: 149.

Record. Mount Kulal.
County. TU.
Distribution. Known only from the type locality.

******Walckenaeria mauensis* **(Holm, 1984)**

W. m. Holm, 1984: 142.

Record. Elburgon.
County. NK.
Distribution. Known only from the type locality.

^ ***Walckenaeria microps*** **(Holm, 1984)**

W. m. Holm, 1984: 143.

Record. Mount Elgon.
County. TZ.
Distribution. Kenya, Uganda.

******Walckenaeria minuscula* **(Holm, 1984) (♀)**

W. m. Holm, 1984: 146.

Record. Aberdare Range.
County. NA.
Distribution. Known only from the type locality.

Walckenaeria nigeriensis **Locket & Russell-Smith, 1980**

W. macrops Holm, 1984: 149.

Records. Mount Elgon, Cherangany Hills.
County. TZ.
Distribution. Nigeria, Kenya.

******Walckenaeria ocularis* **Holm, 1984 (♀)**

W. o. Holm, 1984: 146.

Record. Kakamega Forest.
County. KK.
Distribution. Known only from the type locality.

Liocranidae Simon, 1897

****Andromma bouvieri* Fage, 1936 (♀)**

A. b. Fage, 1936: 85.

Records. Turkana (type locality), Maikana.
County. TU.
Distribution. Kenya.

****Cteniogaster hexomma* Bosselaers & Jocqué, 2013**

C. h. Bosselaers and Jocqué 2013: 16.

Record. Taita Hills.
County. TT.
Distribution. Known only from the type locality.

****Mesiotelus pococki* di Caporiacco, 1949 (♀)**

M. p. di Caporiacco, 1949: 440.

Record. Mau Range.
County. NA.
Distribution. Known only from the type locality.

****Toxoniella rogoae* Warui & Jocqué, 2002**

T. r. Warui and Jocqué 2002: 312.

Record. Taita Hills.
County. TT.
Distribution. Known only from the type locality.

****Toxoniella taitensis* Warui & Jocqué, 2002**

T. t. Warui and Jocqué 2002: 309; Jocqué and Dippenaar-Schoeman 2006: 126.

Record. Taita Hills.
County. TT.
Distribution. Known only from the type locality.

Lycosidae Sundevall, 1833

^*Allocosa delesserti* (di Caporiacco, 1941) (♀)

Hogna d.: di Caporiacco, 1949: 335.

Records. Mackinnon Road, Nairobi.
Counties. KW, NB.
Distribution. Ethiopia, Kenya.

^*Allocosa illegalis* (Strand, 1906) (♀)

Hogna i.: di Caporiacco, 1949: 335.

Record. Nairobi.
County. NB.
Distribution. Ethiopia, Kenya.

^*Allocosa iturianella* Roewer, 1959 (♀)

A. i. Roewer, 1959: 273.

Record. Nairobi.
County. NB.
Distribution. Kenya, Uganda.

Allocosa karissimbica (Strand, 1913) (♀)

A. k.: Roewer 1959: 271.

Record. Nairobi.
County. NB.
Distribution. Central, East Africa.

Amblyothele togona Roewer, 1960

A. t.: Russell-Smith et al. 2009: 174.

Record. Kakamega Forest.
County. KK.
Distribution. Ivory Coast, Cameroon, Togo, DR Congo, Kenya.

******Arctosa berlandi*** **(di Caporiacco, 1949) (♀)**

Hogna b. di Caporiacco, 1949: 335; *A. b.*: Roewer 1960: 622.

Record. Elmenteita.
County. NK.
Distribution. Known only from the type locality.

^*Arctosa nyembeensis* **(Strand, 1916)**

Trochosa njembeensis: di Caporiacco, 1949: 337.

Record. Nairobi.
County. NB.
Distribution. Kenya, Tanzania.
Note. Species was described from a juvenile specimen.

******Evippa projecta*** **Alderweireldt, 1991 (♂)**

E. p. Alderweireldt, 1991: 368.

Record. Lake Turkana.
County. MS.
Distribution. Known only form type locality.

Foveosa foveolata **(Purcell, 1903)**

F. f.: Russell-Smith et al. 2007: 61.

Records. Amara River, Lake Naivasha, Diani Beach, Mount Elgon, 65 km NW of Mombasa on Nairobi Road.
Counties. BM, KW, MM, NK, TZ.
Distribution. Central, East, Southern Africa.

Foveosa tintinabulum **Russell-Smith, Alderweireldt & Jocqué, 2007**

F. t. Russell-Smith et al. 2007: 72.

Record. Nanyuki.
County. LK.
Distribution. Kenya, DR Congo.

***Geolycosa gofensis* (Strand, 1906)**

Trochosa urbana g.: di Caporiacco, 1939: 324.

Record. Moyale.
County. MS.
Distribution. Central, East Africa.

****Geolycosa kijabica* (Strand, 1916) (♀)**

Tarentula k. Strand, 1916a: 110; *Scaptocosa k.*: Roewer, 1959: 380.

Record. Kijabe.
County. KB.
Distribution. Known only from the type locality.

***Hippasa cinerea* Simon, 1898**

H. c.: Alderweireldt and Jocqué 2005: 56.

Records. Mount Elgon, Cherangany Hills.
County. TZ.
Distribution. Africa.

***Hogna atramentata* Karsch, 1879 (♀)**

Trochosa a.: di Caporiacco 1949: 337.

Record. Mau Range.
County. NA.
Distribution. Central, East Africa.

****Hogna enecens* Roewer, 1959 (♀)**

H. e. Roewer, 1959: 438.

Records. Nairobi.
County. NB.
Distribution. Known only from the type locality.

***Hogna irumua* (Strand, 1913)**

H. pulloides i.: di Caporiacco 1949: 335.

Record. Elmenteita.
County. NK.
Distribution. Central, East Africa.

******Hogna nairobia* **(Roewer, 1960) (♀)**

Lycorma n. Roewer, 1960: 789.

Record. Nairobi.
County. NB.
Distribution. Known only from the type locality.

Hogna raffrayi **(Simon, 1876) (♀)**

H. r.: di Caporiacco 1949: 335.

Record. Nairobi.
County. NB.
Distribution. East Africa, Zanzibar.

Ocyale atalanta **Audouin, 1826**

O. a.: di Caporiacco 1949: 338.

Record. Nairobi.
County. NB.
Distribution. East, North Africa.
Note. Considered as *nomen dubium* (WSC 2018), although it is type species of the genus.

******Pardosa gastropicta* **Roewer, 1959**

P. g. Roewer, 1959: 87.

Records. Kibwezi, Mount Elgon.
Counties. MK, TZ.
Distribution. Known only from the type locality.

Pardosa injucunda **(O. Pickard-Cambridge, 1876)**

P. i.: di Caporiacco 1949: 338; Roewer 1959: 35; Alderweireldt and Jocqué 1992: 82.

Records. Mount Kenya, Kabete, Lake Nakuru, Maralal, Mount Elgon, Ewaso Narok River, Mau.

Counties. KB, LK, NI, NK, SB, TZ.
Distribution. Africa.

***Pardosa karagonis* (Strand, 1913)**

P. k.: di Caporiacco 1949: 338.

Record. Mau.
County. NA.
Distribution. Central, East Africa.

***Pardosa messingerae* (Strand, 1916)**

Lycosa proximella m. Strand, 1916a: 102; di Caporiacco 1949: 339; *P. m.*: Roewer 1959: 96; Alderweireldt and Jocqué 1992: 86.

Records. Kijabe, Mount Kenya, Nairobi, Aberdare Escarpment, Maralal, Mount Elgon, Lake Nakuru, Lake Naivasha, Molo, Rusinga Island, Taita Hills.
Counties. HB, KB, NA, NB, NI, NK, SB, TT, TZ.
Distribution. West, Central, East Africa.

***Pardosa schubotzi* (Strand, 1913)** (♀)

P. s.: di Caporiacco 1949: 338.

Record. Mau Range.
County. NA.
Distribution. Central, East Africa.

***Pardosa thompsoni* Alderweireldt & Jocqué, 1992**

P. t. Alderweireldt and Jocqué 1992: 102.

Record. Marsabit, Loiyangalani.
County. MS.
Distribution. Burkina Faso, Kenya, Sudan.

^*Pardosella zavattarii* di Caporiacco, 1939

P. z.: di Caporiacco 1941: 66.

Record. Elolo.
County. MS.
Distribution. Ethiopia, Kenya.

^*Schizocosa hewitti* (de Lessert, 1915)

Hogna h.: di Caporiacco 1949: 335.

Record. Elmenteita.
County. NK.
Distribution. Kenya, Tanzania.

^*Trabea heteroculata* Strand, 1913

T. h.: di Caporiacco 1949: 338; Roewer 1960: 583; Alderweireldt 1999: 451.

Record. Mau.
County. NA.
Distribution. Rwanda, Kenya, Tanzania.

^*Trochosa masumbica* (Strand, 1916)

T. m.: di Caporiacco 1949: 338.

Record. Mau Range.
County. NA.
Distribution. East Africa.

***Trochosa minima* (Roewer, 1960)**

Varacosa m. Roewer, 1960: 526.

Record. Kibwezi.
County. MK.
Distribution. DR Congo, Kenya.

***Trochosa urbana* O. Pickard-Cambridge, 1876**

T. u. urbana: di Caporiacco 1949: 337.

Record. Nairobi.
County. NB.
Distribution. East, North, Central Africa to India.

^*Wadicosa benadira* (di Caporiacco, 1940)

Pardosa b.: Roewer, 1959: 60; *W. b.*: Kronestedt 2015: 3.

Records. Isiolo, Laikipia, Marsabit, Kwale, Taita-Taveta.
Counties. IS, KW, LK, MS, TT.
Distribution. Somalia, Kenya.

******Wadicosa cognata*** **Kronestedt, 2015**

W. c. Kronestedt 2015: 6.

Record. Kajiado.
County. KJ.
Distribution. Known only from the type locality.

Wadicosa oncka **(Lawrence, 1927)**

Pardosa wittei Roewer, 1959: 117; *Pardosa o.*: Kronestedt 1987: 968.

Records. Mombasa, Tsavo, Maralal, Marsabit, Mudanda.
Counties. MM, SB, TT.
Distribution. Africa.

Migidae Simon, 1889

Moggridgea whytei **Pocock, 1897 (♀)**

M. w. Pocock, 1897: 733; Griswold 1987: 106.

Record. Kibwezi.
County. MK.
Distribution. Kenya, Malawi, Zaire, Zambia.

Mimetidae Simon, 1881

******Mimetus bishopi*** **di Caporiacco, 1949 (♀)**

M. b. di Caporiacco, 1949: 425.

Records. Mau Range, Nairobi.
County. NA, NB.
Distribution. Known only from the type locality.

******Reo latro*** **Brignoli, 1979**

R. l. Brignoli, 1979b: 924.

Record. Arabuko Sokoke.
County. KL.
Distribution. Known only from the type locality.

"Miturgidae" Simon, 1886

Note. The family name is taken in inverted commas because the only Kenyan species seems to be erroneously allocated. Miturgidae are not known in Sub-Saharan Africa (WSC 2018).

^*Syrisca drassiformis* Strand, 1906 (♀)

S. d.: di Caporiacco 1949: 441.

Record. Nairobi.
County. NB.
Distribution. Ethiopia, Kenya.
Note. Identification based on a juvenile specimen.

Mysmenidae Petrunkevitch, 1928

**Isela inquilina* (Baert & Murphy, 1987)

Kilifia inquilina Baert and Murphy 1987: 194.

Record. Kilifi.
County. KL.
Distribution. Known only from the type locality.

Ochyroceratidae Fage, 1912

**Speocera bambusicola* Brignoli, 1980 (♂)

S. b. Brignoli, 1980: 297.

Record. Mount Kenya.
County. NI.
Distribution. Known only from the type locality.

**Speocera fagei* (Berland, 1914) (♀)

Theotima f. Berland, 1914: 87; *S. f.*: Brignoli 1980: 295.

Record. Mount Kenya.

County. NI.
Distribution. Known only from the type locality.

Oecobiidae Blackwall, 1862

Oecobius amboseli Shear & Benoit, 1974

O. a. Shear and Benoit 1974: 717.

Records. Maasai Amboseli Reserves, Nairobi.
Counties. KJ, NB, NR.
Distribution. Eastern Africa, Egypt. Introduced to Europe.

Oonopidae Simon, 1890

**Dysderina granulosa* Simon & Fage, 1922

D. g. Simon and Fage 1922: 534.

Record. Shimoni.
County. KW.
Distribution. Known only from the type locality.

**Dysderina perarmata* Fage & Simon, 1936 (♀)

D. p. Fage and Simon 1936: 314.

Record. Mount Elgon.
County. TZ.
Distribution. Known only from the type locality.

**Dysderina straba* Fage, 1936 (♂)

D. s. Fage, in Fage and Simon 1936: 314.

Record. Charangany Hills.
County. TZ.
Distribution. Known only from the type locality.

**Gamasomorpha jeanneli* Fage, 1936

G. j. Fage, in Fage and Simon 1936: 312.

Record. Mount Elgon.

County. TZ.
Distribution. Known only from the type locality.

Gamasomorpha testudinella* **Berland, 1914 (♀)

G. t. Berland, 1914: 83.

Record. Kikuyu.
County. KB.
Distribution. Known only from the type locality.

Khamisia holmi* **Platnick & Berniker, 2015 (♂)

K. h. Platnick and Berniker 2015: 18.

Record. Meru National Park.
County. ME.
Distribution. Known only from the type locality.

Khamisina kilifi* **Platnick & Berniker, 2015 (♂)

K. k. Platnick and Berniker 2015: 22.

Record. Kilifi.
County. KL.
Distribution. Known only from the type locality.

Kijabe ensifera* **di Caporiacco, 1949 (♂)

K. e. di Caporiacco, 1949: 328.

Record. No precise records.
County. K.
Distribution. Known only from the type locality.

Kijabe paradoxa* **Berland, 1914

K. p. Berland, 1914: 72; Simon and Fage 1922: 534.

Records. Kijabe (type locality), Naivasha, Shimoni.
Counties. KB, KW, NK.
Distribution. Kenya.

***_Oonops alticola_ Berland, 1914 (♀)**

O. a. Berland, 1914: 63.

Record. Mount Kenya.
County. NI.
Distribution. Known only from the type locality.

***_Oonops citrinus_ Berland, 1914 (♀)**

O. c. Berland, 1914: 64.

Record. Mount Kenya.
County. NI.
Distribution. Known only from the type locality.

***_Oonops longipes_ Berland, 1914 (♂)**

O. l. Berland, 1914: 65.

Record. Mount Kenya.
County. NI.
Distribution. Known only from the type locality.

***_Opopaea berlandi_ (Simon & Fage, 1922)**

Gamasomorpha b. Simon and Fage 1922: 535; *O. b.*: Saaristo and Marusik 2008: 20.

Record. Shimoni.
County. KW.
Distribution. Known only from the type locality.

***_Opopaea hoplites_ (Berland, 1914)**

Gamasomorpha h. Berland, 1914: 79; *O. h.*: Saaristo and Marusik 2008: 25.

Record. Aberdare Range.
County. NA.
Distribution. Known only from the type locality.

***_Opopaea kulczynskii_ Berland, 1914**

Gamasomorpha k. Berland, 1914: 80; *O. k.*: Saaristo and Marusik 2008: 28.

Record. Shimoni.
County. KW.
Distribution. Known only from the type locality.

^*Opopaea simoni* Berland, 1914

Gamasomorpha s. Berland, 1914: 76; *O. s.*: Saaristo and Marusik 2008: 34.

Records. Mount Kenya, Kijabe, Lake Naivasha, Kikuyu.
Counties. KB, NI, NK.
Distribution. Kenya, Tanzania.

***Orchestina clavigera* Henrard & Jocqué, 2012**

O. c. Henrard and Jocqué 2012: 24.

Record. Kakamega Forest.
County. KK.
Distribution. Known only from the type locality.

***Orchestina communis* Henrard & Jocqué, 2012**

O. c. Henrard and Jocqué 2012: 28.

Record. Kakamega Forest.
County. KK.
Distribution. Ghana to Kenya.

***Orchestina gibbotibialis* Henrard & Jocqué, 2012**

O. g. Henrard and Jocqué 2012: 55.

Record. Gatamaiyu Forest.
County. KB.
Distribution. Known only from the type locality.

***Pelicinus marmoratus* Simon, 1892**

P. m.: Platnick et al. 2012: 18.

Record. Kilifi.
County. KL.
Distribution. Tropical Asia. Introduced to Pacific Is., Caribbean, Brazil, Canary Is., Kenya and Seychelles.

******Triaeris macrophthalmus macrophthalmus*** **Berland, 1914**

T. m. m. Berland, 1914: 66; Fage and Simon 1936: 311.

Records. Mount Kenya (type locality), crater of Mount Longonot, Mount Elgon.
Counties. NI, NK.
Distribution. Kenya.

^*Triaeris macrophthalmus cryptops* **Berland, 1914 (♂)**

T. m. c. Berland, 1914: 71.

Record. Mount Kenya.
County. NI.
Distribution. Kenya, Zanzibar.

******Triaeris macrophthalmus medius*** **Berland, 1914 (♂)**

T. m. media Berland, 1914: 70.

Record. Mount Kenya.
County. NI.
Distribution. Known only from the type locality.

Oxyopidae Thorell, 1870

^*Oxyopes africanus* **Strand, 1906 (♂)**

O. a.: di Caporiacco 1939: 337.

Record. Moyale.
County. MS.
Distribution. Ethiopia, Kenya.

^*Oxyopes bedoti* **de Lessert, 1915 (♀)**

O. b.: di Caporiacco 1949: 339.

Record. Nairobi.
County. NB.
Distribution. East Africa.

^*Oxyopes delesserti* di Caporiacco, 1947 (♂)

O. d.: di Caporiacco 1949: 339.

Record. Mackinnon Road.
County. KW.
Distribution. Ethiopia, East Africa.

***Oxyopes dumonti* (Vinson, 1863)**

O. d.: di Caporiacco 1949: 340.

Record. Mackinnon Road.
County. KW.
Distribution. East Africa, Madagascar to Seychelles.

***Oxyopes hoggi* de Lessert, 1915**

O. h.: di Caporiacco 1949: 342.

Record. Mackinnon Road.
County. KW.
Distribution. East Africa, Angola.

^*Oxyopes falconeri* de Lessert, 1915

O. f.: di Caporiacco 1949: 342.

Record. Mau.
County. NA.
Distribution. East Africa.

***Oxyopes pallidecoloratus* Strand, 1906**

O. p.: di Caporiacco 1949: 340; Warui et al. 2004: 19.

Records. Mau, Mpala Ranch.
Counties. LK, NA.
Distribution. Ethiopia, Congo, East Africa, Madagascar.

^*Oxyopes strandi* di Caporiacco, 1939 (♂)

O. s. di Caporiacco, 1939: 336.

Record. Moyale.
County. MS.
Distribution. Ethiopia, Kenya.

^*Oxyopes subabebae* di Caporiacco, 1941 (♀)

O. s.: di Caporiacco 1949: 340.

Record. Mau.
County. NA.
Distribution. Ethiopia, Kenya.

****Oxyopes toschii* di Caporiacco, 1949**

O. t. di Caporiacco, 1949: 340.

Record. Elmenteita.
County. NK.
Distribution. Known only from the type locality.

***Peucetia lesserti* van Niekerk & Dippenaar-Schoeman, 1994**

P. l. van Niekerk and Dippenaar-Schoeman 1994: 19.

Record. Kangatotha, Turkana District, Lothagam.
County. TU.
Distribution. Kenya, Niger.

^*Peucetia minima* Strand, 1906

P. m.: di Caporiacco 1949: 339.

Record. Elmenteita.
County. NK.
Distribution. Ethiopia, Kenya.
Note. Considered as *nomen dubium* by van Niekerk and Dippenaar-Schoeman (1994) and WSC (2018).

***Peucetia striata* Karsch, 1878**

P. s. striata: di Caporiacco 1949: 339.

Record. Nairobi.

County. NB.
Distribution. Yemen to South Africa, Comoros. Introduced to St. Helena.

Palpimanidae Thorell, 1870

^*Boagrius incisus* Tullgren, 1910

B. i.: Berland 1920b: 115; Warui et al. 2004: 19.

Records. Likoni, Mombasa, Mpala Ranch.
Counties. LK, MM.
Distribution. Kenya, Tanzania.

**Hybosida lesserti* Berland, 1920 (♂)

H. l. Berland 1920a: 347; 1920b: 109.

Record. Aberdare: Mount Kinangop.
County. NA.
Distribution. Known only from the type locality.

**Hybosida scabra* Simon & Fage, 1922 (♂)

H. s. Simon and Fage 1922: 536.

Record. Shimoni.
County. KW.
Distribution. Known only from the type locality.

Philodromidae Thorell, 1870

**Philodromus alboniger* di Caporiacco, 1949

P. a. di Caporiacco, 1949: 453.

Record. Nairobi.
County. NB.
Distribution. Known only from the type locality.
Note. Identification based on a juvenile specimen.

**Philodromus caporiaccoi* Roewer, 1951 (♀)

P. montanus di Caporiacco, 1949: 450; *P. c.* Roewer 1951: 448.

Record. Mau Forest.
County. NA.
Distribution. Known only from the type locality.

^*Philodromus legae* di Caporiacco, 1941 (♀)

P. l.: di Caporiacco 1949: 450.

Record. Mau.
County. NA.
Distribution. Ethiopia, Kenya.

***_Philodromus pesbovis_ di Caporiacco, 1949 (♀)**

P. p. di Caporiacco, 1949: 451.

Record. Elmenteita.
County. NK.
Distribution. Known only from the type locality.

***Tibellus flavipes* di Caporiacco, 1939**

T. f. di Caporiacco, 1939: 360; Van den Berg and Dippenaar-Schoeman 1994: 94.

Record. Moyale.
County. MS.
Distribution. East, Southern Africa.

***Tibellus kibonotensis* de Lessert, 1919**

T. k.: di Caporiacco 1949: 450.

Records. Nairobi.
County. NB.
Distribution. East, Southern Africa.

***Tibellus minor* de Lessert, 1919**

T. m.: Van den Berg and Dippenaar-Schoeman 1994: 101.

Record. Karura Forest.
County. NB.
Distribution. Africa.

Pholcidae C. L. Koch, 1850

***Artema atlanta* Walckenaer, 1837**

A. a.: di Caporiacco 1949: 326.

Record. Nairobi.

County. NB.

Distribution. Northern Africa and Middle East. Introduced elsewhere (mainly tropical and subtropical regions), Kenya.

^*Buitinga mbomole* Huber, 2003

B. m. Huber, 2003: 578.

Record. Shimba Hills.

County. KW.

Distribution. Kenya, Tanzania.

^*Buitinga nigrescens* (Berland, 1920) (♀)

Spermophora n. Berland, 1920b: 137; *B. n.*: Huber 2003: 568.

Record. Mount Kenya.

County. NI.

Distribution. Kenya, Tanzania.

*****Buitinga wataita* Huber & Warui, 2012**

B. w. Huber and Warui 2012: 22.

Record. Taita Hills.

County. TT.

Distribution. Known only from the type locality.

***Crossopriza johncloudsleyi* Deeleman-Reinhold & van Harten, 2001**

C. j.: Huber and Warui 2012: 18.

Records. Lake Hannington (Lake Bogoria), Lake Baringo, Baringo, Lothagam, Kangatotha, Kajiado.

Counties. BR, KJ, TU.

Distribution. Yemen, Kenya.

***Leptopholcus budongo* Huber, 2011**

L. b. Huber, 2011: 76.

Record. Kakamega Forest.
County. KK.
Distribution. DR Congo, Kenya, Uganda.

***Leptopholcus gracilis* Berland, 1920**

L. g. Berland, 1920b: 131; Huber 2011: 71.

Records. Taita, Arabuko Sokoke Forest, Jilore Forest, Gedi Forest.
Counties. KL, TT.
Distribution. Somalia, Kenya, Tanzania, Mozambique, South Africa.

***Leptopholcus signifer* Simon, 1893**

L. s.: Huber 2011: 67.

Record. Langata.
County. NB.
Distribution. Angola, Kenya.

^*Ninetis minuta* (Berland, 1920)

Myrmidonella m. Berland, 1920b: 126.

Record. Nairobi.
County. NB.
Distribution. Somalia, Kenya, Tanzania.

*****Pholcus chappuisi* Fage, 1936**

P. c. Fage, in Fage and Simon 1936: 315; Huber 2011: 186.

Records. Mount Elgon (type locality), Kwaisagat, Kitale Museum Forest, Kitale, Endebess, Cherangani Hills, Thompson Falls, Molo, Mount Kenya, Ruiru, north of Castle Forest Lodge.
Counties. KB, KY, LK, NK, NI, TZ, WP.
Distribution. Kenya.

^*Pholcus fagei* Kratochvíl, 1940

P. lucifugus: Simon and Fage 1922: 540; *P. f.* Kratochvíl, 1940: 4; Huber 2011: 247.

Records. Shimoni Caves, Shimba Hills, Arabuko Sokoke, Kilifi.
Counties. KL, KW.
Distribution. Kenya, Tanzania.

***Pholcus leruthi* de Lessert, 1935**

P. l.: Huber 2011: 216.

Record. Kakamega Forest.
County. KK.
Distribution. DR Congo, East Africa.

^*Pholcus kwamgumi* Huber, 2011

P. k. Huber, 2011: 264.

Record. Jilore Forest.
County. KL.
Distribution. Kenya, Tanzania.

*****Pholcus taita* Huber, 2011**

P. t. Huber, 2011: 251.

Records. Taita Hills (type locality), Chyulu Hills.
Counties. MK, TT.
Distribution. Kenya.

^*Quamtana nyahururu* Huber & Warui, 2012

Q. n. Huber and Warui 2012: 39.

Records. Thompson Falls, Naro Moru, Kikuyu Escarpment, Muthaiga Golf Club, Kirimeri Forest near Runyenjes (Kirimiri?).
Counties. EB, KB, LK, NB, NI.
Distribution. Kenya, Tanzania.

*****Smeringopus chogoria* Huber, 2012**

S. c. Huber, 2012: 29.

Records. Mount Kenya Chogoria Forest (type locality), Mount Elgon, Endebess, Mau Escarpment.

Counties. NA, NI, TZ.

Distribution. Kenya.

^*Smeringopus ngangao* Huber, 2012

S. n. Huber, 2012: 31.

Record. Taita Hills.

County. TT.

Distribution. Kenya, Tanzania.

Smeringopus peregrinoides Kraus, 1957

S. p.: Huber 2012: 100.

Records. Kakamega Forest, Mtembur, Kongelai.

Counties. KK, WP.

Distribution. Central, East Africa.

Smeringopus peregrinus Strand, 1906

S. p.: Berland 1920b: 129; di Caporiacco 1949: 327; Huber 2012: 93.

Records. Taita Hills, Kilaguni Camp, Tsavo West, "Région côtière, Kiwi", Watamu, Kilifi, Malindi, Gedi Forest, Kitale, Lake Naivasha, Longonot Crater, Hell's Gate N.P, Kajiado, Mpala Ranch, Nairobi, Athi River, Gonkonyi River, Machakos District, Tsavo East and West National Park, Murera, Ol Donyo Sabuk N.P, Kiboko, Mount Kenya, Fourteen Falls, unidentified localities in Kenya: "Ngunga", "Tana River", "Fort Hall" (Murang'a?), Elmenteita, Mombasa.

Counties. KB, KJ, KL, KR, KW, LK, MC, MM, MU, NB, NI, NK, TT, TZ.

Distribution. Kenya, Uganda, Tanzania, Madagascar.

^*Smeringopus turkana* Fage, 1936

S. arambourgi Fage, in Fage and Simon 1936: 319, *S. t.*: Huber 2012: 38.

Records. Kacheliba, Lodwar, Turkana, Kamatira, Kongelai, Lake Baringo.

Counties. BR, TU, WP.

Distribution. Ethiopia, Kenya.

***_Spermophora berlandi_ Fage, 1936**

S. b. Fage, in Fage and Simon 1936: 31; Huber 2003: 601.

Record. Cherangany Hills.
County. TZ.
Distribution. Known only from the type locality.

^_Spermophora bukusu_ Huber & Warui, 2012

S. b. Huber and Warui 2012: 32.

Records. Mount Elgon, Kitale Museum Forest.
County. TZ.
Distribution. Kenya, Uganda.

***_Spermophora kirinyaga_ Huber & Warui, 2012**

S. k. Huber and Warui 2012: 34.

Record. Mount Kenya National Park.
County. NI.
Distribution. Known only from the type locality.

***_Spermophora maathaiae_ Huber & Warui, 2012**

S. m. Huber and Warui 2012: 29.

Record. Mount Kenya.
County. NI.
Distribution. Known only from the type locality.

***_Spermophora mau_ Huber & Warui, 2012**

S. m. Huber and Warui 2012: 27.

Record. Mau Escarpment.
County. NA.
Distribution. Known only from the type locality.

***_Spermophora minotaura_ Berland, 1920**

S. m. Berland, 1920b: 133; 1932: 276; di Caporiacco 1949: 327; Huber 2003: 602.

Records. Mount Kenya (type locality), Eldoret, Mau, Castle Forest Lodge.
Counties. KY, NA, NI, UG.
Distribution. Kenya.
Note. Most likely record of this species from Mau by di Caporiacco (1949) refers to *S. mau*.

Phyxelididae Lehtinen, 1967

**Kulalania antiqua* Griswold, 1990 (♀)

K. a. Griswold, 1990: 125.

Record. Kulal Mountain.
County. TU.
Distribution. Known only from the type locality.

^*Phyxelida apwania* Griswold, 1990 (♀)

P. a. Griswold, 1990: 184.

Record. Shimba Hills.
County. KW.
Distribution. Kenya, Tanzania.

Phyxelida bifoveata (Strand, 1913)

P. b.: Griswold 1990:177.

Record. Mount Kenya.
County. TN.
Distribution. Kenya, Rwanda, Tanzania, Zaire.

**Phyxelida carcharata* Griswold, 1990

P. c. Griswold, 1990: 162; Jocqué and Dippenaar-Schoeman 2006: 208.

Records. Mau Range, Kericho (type locality).
Counties. KR, NA.
Distribution. Kenya.

**Phyxelida crassibursa* Griswold, 1990 (♀)

P. c. Griswold, 1990: 174.

Record. Mount Elgon.
County. TZ.
Distribution. Known only from the type locality.

Phyxelida irwini* **Griswold, 1990 (♀)

P. i. Griswold, 1990: 171.

Record. 22 mi N of Nairobi
County. NA.
Distribution. Known only from the type locality.

^*Phyxelida nebulosa* (Tullgren, 1910)

Haemilla n.: di Caporiacco, 1949: 323.

Record. Mau.
County. NA.
Distribution. Kenya, Tanzania.

Phyxelida pingoana* **Griswold, 1990 (♀)

P. p. Griswold, 1990: 165.

Records. Mount Elgon.
County. TZ.
Distribution. Known only from the type locality.

Phyxelida sindanoa* **Griswold, 1990

P. s. Griswold, 1990: 159.

Records. Mount Elgon, Kaptega River (type locality), Kapenguria, Mount Kenya.
Counties. TN, TZ, WP.
Distribution. Kenya.

Pisauridae Simon, 1890

***Charminus aethiopicus* (di Caporiacco, 1939)**

Cispius a. di Caporiacco, 1939: 318; *Cispius novus*: di Caporiacco, 1949: 333; *C. a.*: Sierwald 1997: 379.

Records. Elmenteita, Moyale.
Counties. MS, NK.
Distribution. Africa.

***Euprosthenops bayaonianus* (Brito Capello, 1867)**

E. b.: Blandin 1976: 68.

Record. Kilimambogo.
County. KB.
Distribution. West, Central, East Africa.

***Euprosthenops hilaris* (O. Pickard-Cambridge, 1877)**

E. h.: di Caporiacco 1949: 332.

Record. Nairobi.
County. NB.
Distribution. Ethiopia, Kenya, Madagascar.
Note. Considered a *nomen dubium* (WSC 2018).

***Euprosthenops proximus* de Lessert, 1916**

E. p.: di Caporiacco 1940: 784; di Caporiacco 1949: 332.

Records. Elmenteita, Nairobi, Olorgesailie.
Counties. NB, NK.
Distribution. Central, East, Southern Africa.

***Euprosthenopsis armata* (Strand, 1913)**

Euprosthenops armatus: di Caporiacco 1949: 333.

Record. Mackinnon Road.
County. KW.
Distribution. Central, East Africa.

******Euprosthenopsis rothschildi*** Blandin, 1977 (♀)**

E. r. Blandin, 1977: 143.

Record. Mount Loroghi.
County. SB.
Distribution. Known only from the type locality.

***Hygropoda tangana* (Roewer, 1955)**

H. t.: da Silva 2013: 290.

Record. Shimba hills.
County. KW.
Distribution. Tanzania, Kenya, South Africa, Madagascar.

***Maypacius bilineatus* (Pavesi, 1895)**

M. b.: di Caporiacco 1949: 333.

Record. Nairobi.
County. NB.
Distribution. Central, East Africa, Madagascar.

***Maypacius stuhlmanni* (Bösenberg & Lenz, 1895)**

Tetragonophthalma s.: Pocock 1898c: 518.

Records. Taru, Samburu.
Counties. KJ, SB.
Distribution. Tanzania (mainland, Zanzibar), Kenya.
Note. Pocock (1898c) mentioned two males from Kenya belonging to the species recorded by Bösenberg and Lenz (1895) or a species closely related to it.

***Nilus curtus* O. Pickard-Cambridge, 1876**

Dolomedes ingens di Caporiacco, 1939: 320; *D. aethiops*: di Caporiacco, 1939: 322.

Record. Moyale.
County. MS.
Distribution. Africa.

***Nilus margaritatus* (Pocock, 1898)**

Thalassius margaritatus Pocock, 1898c: 518; *T. albopunctatus* di Caporiacco, 1949: 334.

Records. Mackinnon Road, Samburu, Taru.
Counties. KJ, KW, SB.
Distribution. Central, East, South Africa.

***Perenethis simoni* (de Lessert, 1915)**

Tetragonophthalma s.: di Caporiacco, 1949: 333; *P. s.*: Sierwald 1997: 391.

Records. Nanyuki, Nairobi.
Counties. LK, NB.
Distribution. Africa, Comoros.

***Perenethis symmetrica* (Lawrence, 1927)**

P. s.: Sierwald 1997: 395.

Record. Lake Nakuru Preserve.
County. NK.
Distribution. Africa.

***Rothus aethiopicus* (Pavesi, 1883)**

R. a.: di Caporiacco 1949: 333; da Silva and Sierwald 2015: 327.

Records. Elmenteita, Lake Nakuru National Park.
County. NK.
Distribution. Africa, Israel.

Prodidomidae Simon, 1884

This family currently considered as subfamily of Gnaphosidae (WSC 2020).

*****Anagrina alticola* Berland, 1920**

A. a. Berland, 1920b: 100; di Caporiacco 1949: 427.

Records. Aberdare Range (type locality), Mount Kenya, Mau Forest.
Counties. NA, NI.
Distribution. Kenya.

****Prodidomus dalmasi* Berland, 1920 (♂)**

P. d. Berland, 1920a: 347; 1920b: 98; Cooke 1964: 273.

Record. Nairobi.
County. NB.
Distribution. Known only from the type locality.

Salticidae Blackwall, 1841

****Afraflacilla roberti*** **(Wesołowska, 2011)**

Pseudicius r. Wesołowska, 2011: 485; *A .r.*: Prószyński 2017: 43.

Record. Mbita Point.
County. HB.
Distribution. Known only from the type locality.

Afromarengo coriacea **(Simon, 1900)**

A. c.: Benjamin 2004: 66; Dawidowicz and Wesołowska 2016: 438.

Records. Gala Estate, Tana River, Warges Hill, Diani Beach, Mombasa.
Counties. KW, MM, MS, SB, TR.
Distribution. Central, East, Southern Africa.

Ansienulina mirabilis **Wesołowska, 2015**

A. m. Wesołowska, 2015: 478.

Record. Kiseni, Kakamega Forest.
County. KK.
Distribution. Kenya, Angola, Namibia.

****Asemonea flava*** **Wesołowska, 2001 (♀)**

A. f. Wesołowska, 2001b: 578.

Record. Mount Elgon.
County. TZ.
Distribution. Known only from the type locality.

Asemonea murphyae **(Wanless, 1980)**

A. murphyi Wanless, 1980: 231; *A. murphyae*: Wesołowska, 2001a: 579.

Records. Naro Moru, Kitale Forest, Mount Elgon.
Counties. NI, TZ.
Distribution. Kenya, South Africa.

******Asemonea pallida*** **Wesołowska, 2001 (♀)**

A. p. Wesołowska, 2001b: 581.

Record. Cherangany Hills.
County. TZ.
Distribution. Known only from the type locality.

******Asemonea serrata*** **Wesołowska, 2001 (♂)**

A. s. Wesołowska, 2001b: 582.

Record. Mount Elgon.
County. TZ.
Distribution. Known only from the type locality.

Asemonea stella **Wanless, 1980**

A. s. Wanless, 1980: 237; Szűts 2000: 63.

Record. Kilifi.
County. KL.
Distribution. Kenya, Tanzania, South Africa. Introduced to Australia.

Belippo calcarata **(Roewer, 1942)**

B. c.: Wesołowska and Wiśniewski 2015: 549.

Record. Kakamega Forest.
County. KK.
Distribution. Angola, DR Congo, Equatorial Guinea, Kenya, South Africa.

******Belippo elgonensis*** **Wesołowska & Wiśniewski, 2015 (♂)**

B. e. Wesołowska and Wiśniewski 2015: 551.

Record. Mount Elgon.
County. TZ.
Distribution. Known only from the type locality.

Belippo milloti **(de Lessert, 1942)**

B. m.: Wesołowska and Wiśniewski 2015: 552.

Records. Mount Elgon, Kikuyu Escarpment Forest.
Counties. NA, TZ.
Distribution. Nigeria, DR Congo, Kenya.

****Belippo terribilis*** **Wesołowska & Wiśniewski, 2015 (♂)**

B. t. Wesołowska and Wiśniewski 2015: 553.

Record. Mlaba Forest.
County. KK.
Distribution. Known only from the type locality.

****Bianor ghigii*** **(di Caporiacco, 1949) (♀)**

Modunda g. di Caporiacco, 1949: 484.

Record. Elmenteita.
County. NK.
Distribution. Known only from the type locality.

****Bianor murphyi*** **Logunov, 2001**

B. m. Logunov, 2001: 242.

Record. Lake Baringo.
County. BR.
Distribution. Known only from the type locality.

****Brancus hemmingi*** **di Caporiacco, 1949 (♀)**

B. h. di Caporiacco, 1949: 466.

Record. Mau Forest.
County. NA.
Distribution. Known only from the type locality.

****Brancus poecilus*** **di Caporiacco, 1949**

B. p. di Caporiacco, 1949: 468.

Record. Mau Forest.
County. NA.
Distribution. Known only from the type locality.

***_Brancus signatus_ Dawidowicz & Wesołowska, 2016 (♀)**

B. s. Dawidowicz and Wesołowska 2016: 439.

Record. Mount Elgon.
County. TZ.
Distribution. Known only from the type locality.

***Bristowia afra* Szűts, 2004**

B. a.: Dawidowicz and Wesołowska 2016: 440.

Record. Mount Elgon.
County. TZ.
Distribution. DR Congo, Kenya.

***Cembalea plumosa* (de Lessert, 1925)**

C. p.: Dawidowicz and Wesołowska 2016: 441.

Record. Shimba Hills.
County. KW.
Distribution. Kenya, Tanzania, South Africa.

***_Copocrossa albozonata_ di Caporiacco, 1949**

C. a. di Caporiacco, 1949: 463.

Record. Mau Range.
County. NA.
Distribution. Known only from the type locality and by juvenile specimen.

***Cyrba boveyi* de Lessert, 1933**

C. b.: Wanless 1984: 463.

Record. Baringo.
County. BR.
Distribution. Angola, Kenya, Mozambique, South Africa.

***Cyrba simoni* (Simon, 1886)**

C. bimaculata: Wanless 1984: 461.

Record. Gedi Forest.
County. KL.
Distribution. Tropical Africa.

******Dendryphantes elgonensis*** **Wesołowska & Dawidowicz, 2014 (♂)**

D. e. Wesołowska & Dawidowicz, 2014: 67.

Records. Mount Elgon (type locality), Warges Hill.
Counties. SB, TZ.
Distribution. Kenya.

^*Dendryphantes hewitti* de Lessert, 1925

D. h.: Wesołowska 2012: 202; Wesołowska and Dawidowicz 2014: 69.

Records. Mbita Point, Mount Elgon, Mount Kulal, Warges Hill, Aberdare Range, Nairobi, Nakuru.
Counties. HB, NA, NB, NK, SB, TU, TZ.
Distribution. Kenya, Tanzania.

******Dendryphantes holmi*** **Wesołowska & Dawidowicz, 2014**

D. h. Wesołowska & Dawidowicz, 2014: 69.

Records. Mount Elgon, Cherangany Hills (type locality).
County. TZ.
Distribution. Kenya.

******Dendryphantes luridus*** **Wesołowska & Dawidowicz, 2014**

D. l. Wesołowska & Dawidowicz, 2014: 71.

Records. Mount Elgon (type locality), Cherangany Hills.
County. TZ.
Distribution. Kenya.

******Dendryphantes minutus*** **Wesołowska & Dawidowicz, 2014 (♂)**

D. m. Wesołowska and Dawidowicz 2014: 72.

Records. Nairobi (type locality), Maralal, Mount Elgon.
Counties. NB, SB, TZ.
Distribution. Kenya.

******Dendryphantes serratus*** **Wesołowska & Dawidowicz, 2014 (♂)**

D. s .Wesołowska & Dawidowicz, 2014: 73.

Records. Cherangany Hills (type locality), Mount Kenya.
Counties. NI, TZ.
Distribution. Kenya.

******Dendryphantes subtilis*** **Wesołowska & Dawidowicz, 2014 (♂)**

D. s. Wesołowska and Dawidowicz 2014: 73.

Record. Mount Elgon.
County. TZ.
Distribution. Known only from the type locality.

******Enoplomischus spinosus*** **Wesołowska, 2005 (♀)**

E. s. Wesołowska, 2005: 309.

Record. Kakamega Forest.
County. KK.
Distribution. Known only from the type locality.

******Euophrys megastylus*** **di Caporiacco, 1949**

E. m. di Caporiacco, 1949: 480.

Record. No precise records.
County. K.
Distribution. Known only from the type locality.
Note. Judging from the figures, this species is misplaced in the genus.

^*Evarcha chappuisi* **de Lessert, 1925**

E. c.: di Caporiacco 1949: 466; Dawidowicz and Wesołowska 2016: 441.

Records. Mount Elgon, Nairobi.
Counties. NB, TZ.
Distribution. Kenya, Tanzania.

******Evarcha culicivora*** **Wesołowska & Jackson, 2003**

E. c. Wesołowska & Jackson, 2003: 335.

Record. Mbita Point.
County. HB.
Distribution. Known only from the type locality.

Evarcha flagellaris **Haddad & Wesołowska, 2011**

E. f.: Dawidowicz and Wesołowska 2016: 442.

Record. Mount Elgon.
County. TZ.
Distribution. Kenya, South Africa.

Evarcha prosimilis **Wesołowska & Cumming, 2008**

E. p.: Dawidowicz and Wesołowska 2016: 442.

Record. Elgon.
County. TZ.
Distribution. Kenya, Tanzania, Zimbabwe, South Africa.

Festucula festuculaeformis **(de Lessert, 1925)**

F. f.: Azarkina and Foord 2014: 359; Dawidowicz and Wesołowska 2016: 442.

Records. Mount Elgon, Lake Nakuru.
Counties. NK, TZ.
Distribution. Eastern Africa.

Goleba puella **(Simon, 1885)**

G. p.: Wanless 1980: 246.

Record. Kilifi.
County. KL.
Distribution. Ghana, Congo, Kenya, Angola, South Africa.

****Habrocestum naivasha*** **Dawidowicz & Wesołowska, 2016**

H. n. Dawidowicz & Wesołowska, 2016: 443.

Records. Lake Naivasha (type locality), Kakamega Forest, Maralal, Nakuru, Trans Nzoia, Cherangany Hills, Mount Elgon.
Counties. KK, NK, SB, TZ.
Distribution. Kenya.

^*Habrocestum subdotatum* di Caporiacco, 1940

H. s.: di Caporiacco, 1949: 472.

Record. No precise records.
County. K.
Distribution. Ethiopia, East Africa.
Note. Identification based on a juvenile specimen.

***Harmochirus bianoriformis* Strand, 1907**

H. b.: di Caporiacco 1949: 486; Warui et al. 2004: 20.

Records. Mpala Ranch, Nairobi.
Counties. LK, NB.
Distribution. Central, East Africa, Madagascar.

^*Hasarinella roeweri* (de Lessert, 1925)

H. r.: Dawidowicz and Wesołowska 2016: 444.

Records. Kalimoni, Namanga, Shimba Hills, Mount Kulal, Nairobi, Karura Forest.
Counties. KB, KJ, KW, NB, TU.
Distribution. Kenya, Tanzania.

***Hasarius adansoni* (Audouin, 1826)**

H. a.: di Caporiacco 1949: 487; Wanless 1984: 49.

Records. Mackinnon Road; Nairobi, Watamu.
Counties. KL, KW, NB.
Distribution. Pantropical.

***Heliophanus aberdarensis* Wesołowska, 1986**

H. a. Wesołowska, 1986: 224.

Record. Aberdare Range.
County. NA.
Distribution. Kenya, South Africa.

***Heliophanus anymphos* Wesołowska, 2003 (♂)**

H. a. Wesołowska, 2003: 253.

Record. Mount Elgon.
County. TZ.
Distribution. Known only from the type locality.

^*Heliophanus crudeni* de Lessert, 1925

H. c.: di Caporiacco 1949: 479.

Record. Nairobi.
County. NB.
Distribution. Kenya, Tanzania.

Heliophanus orchesta Simon, 1886

H. decoloratus: di Caporiacco, 1949: 479.

Record. Mackinnon Road.
County. KW.
Distribution. Central, East, Southern Africa, Madagascar.

Heliophanus giltayi de Lessert, 1933

H. clercki di Caporiacco, 1949: 477; *H. g*: Wesołowska 1986: 24.

Records. Mau, Nairobi.
Counties. NA, NB.
Distribution. Kenya to Angola.

Heliophanus gladiator Wesołowska, 1986

H. g. Wesołowska, 1986: 38.

Records. Aberdare Range, Mount Kenya.
Counties. NA, NI.
Distribution. Kenya, Malawi.

Heliophanus imperator Wesołowska, 1986

H. i. Wesołowska, 1986: 25; 2003: 265.

Records. Aberdare Range, Mount Kenya, Mount Elgon, Cherangany Hills.
Counties. NA, TN, TZ.
Distribution. Kenya, Malawi.

*****Heliophanus jacksoni* Wesołowska, 2011**

H. j. Wesołowska, 2011: 482.

Record. Mbita Point.
County. HB.
Distribution. Known only from the type locality.

***Heliophanus macentensis* Berland & Millot, 1941 (♀)**

H. m. Berland and Millot 1941: 323; Wesołowska 1986: 227.

Record. Kakamega Forest.
County. KK.
Distribution. Ivory Coast to Kenya.

*****Heliophanus maralal* Wesołowska, 2003 (♂)**

H. m. Wesołowska, 2003: 272.

Record. Maralal.
County. MS.
Distribution. Known only from the type locality.

*****Heliophanus minor* Dawidowicz & Wesołowska, 2016 (♂)**

H. m. Dawidowicz and Wesołowska 2016: 445.

Record. Diani Beach.
County. KW.
Distribution. Known only from the type locality.

***Heliophanus orchesta* Simon, 1886**

Heliophanus ambiguus: de Lessert, 1925: 458; di Caporiacco 1939: 369.

Record. Moyale.
County. MS.
Distribution. Central, East, Southern Africa, Madagascar.

***Heliophanus pauper* Wesołowska, 1986**

H. p. Wesołowska, 1986: 228; 2000: 154.

Record. Athi River.
County. MC.
Distribution. Ethiopia, Zambia, Kenya, Zimbabwe, South Africa.

****Heliophanus validus*** **Wesołowska, 1986**

H. v. Wesołowska, 1986: 27.

Record. Nairobi.
County. NB.
Distribution. Known only from the type locality.

****Hispo continentalis*** **(di Caporiacco, 1949)**

Astaenorchestes c. di Caporiacco, 1949: 462.

Record. Nairobi.
County. NB.
Distribution. Known only from the type locality.
Note. Description based on a juvenile female. Wanless (1981) considered this species as *nomen dubium*.

Hispo georgius **(Peckham & Peckham, 1892)**

H. georgii: Dawidowicz & Wesołowska, 2016: 446.

Record. Diani Beach.
County. KW.
Distribution. Central, East, Southern Africa, Madagascar.

Holcolaetis vellerea **Simon, 1910**

H. v.: Wanless 1985: 255.

Records. Kakamega Forest, Nairobi Muthaiga Golf Course, Kitale, Lake Hannington.
Counties. BR, KK, NB, TZ.
Distribution. Africa.

Holcolaetis xerampelina **Simon, 1886**

H. x.: di Caporiacco 1949: 461.

Records. Elmenteita, Mackinnon Road, Nairobi.

Counties. KW, NB, NK.
Distribution. Kenya, Malawi, Tanzania, Zambia, Zimbabwe.

***Holcolaetis zuluensis* Lawrence, 1937**

H. z.: Wanless 1985: 253; Dawidowicz and Wesołowska 2016: 446.

Record. Sagana.
County. KY.
Distribution. Kenya, Tanzania, Southern Africa.
Note. Wanless (1985) mentioned species as occurring in Kenya just in the key, but no data were provided for exact material and collecting locality.

***Hyllus dotatus* (Peckham & Peckham, 1903)**

H. d.: di Caporiacco 1939: 381; *Evarcha dotata*: Dawidowicz and Wesołowska 2016: 441.

Records. Mount Elgon, Lake Hannington, Kitale, Moyale.
Counties. MS, TZ.
Distribution. Sudan to Southern Africa, Yemen.

****Hyllus multiaculeatus* di Caporiacco, 1949 (♂)**

H. m. di Caporiacco, 1949: 465.

Record. Nairobi.
County. NB.
Distribution. Known only from the type locality.

***Hyllus plexippoides* Simon, 1906**

Viciria lawrencei: di Caporiacco, 1949: 469; *H. p.*: Dawidowicz and Wesołowska 2016: 446.

Records. Elgon, Nairobi.
Counties. NB, TZ.
Distribution. Ivory Coast to Sudan, Congo, Kenya, Zambia.

^*Hyllus ramadanii* Wesołowska & Russell-Smith, 2000

H. r.: Dawidowicz and Wesołowska 2016: 446.

Record. Shimba Hills.
County. KW.
Distribution. Kenya, Tanzania.

***Hyllus treleaveni* Peckham & Peckham, 1902**

H. t.: Wesołowska and Cumming 2004: 579.

Record. Sagana.
County. MC.
Distribution. Africa.

***Icius grassei* (Berland & Millot, 1941)**

I. g.: Wesołowska 2017: 253.

Record. Nyeri District.
County. NI.
Distribution. Malawi, Nigeria, DR Congo, Kenya.

Icius mbitaensis* **Wesołowska, 2011

I. m. Wesołowska, 2011: 483.

Record. Mbita Point.
County. HB.
Distribution. Known only from the type locality.

***Icius ocellatus* Pavesi, 1883**

I. o.: di Caporiacco 1949: 483.

Records. Mau Range, Nairobi.
Counties. NA, NB.
Distribution. East Africa.

^*Icius steeleae* Logunov, 2004

I. s.: Dawidowicz and Wesołowska 2016: 446.

Record. Elgon.
County. TZ.
Distribution. Sudan, Kenya, Uganda.

******Kakamega holmi*** **Dawidowicz & Wesołowska, 2016**

K. h. Dawidowicz and Wesołowska 2016: 446.

Record. Kakamega Forest.
County. KK.
Distribution. Known only from the type locality.

******Kima montana*** **Wesołowska & Szeremeta, 2001 (♀)**

K. m. Wesołowska and Szeremeta 2001: 224.

Record. Mount Elgon.
County. TZ.
Distribution. Known only from the type locality.

^***Langelurillus furcatus*** **Wesołowska & Russell-Smith, 2000**

L. f. Wesołowska and Russell-Smith 2000: 55; Dawidowicz and Wesołowska 2016: 448.

Records. Mount Kisigau, Shimoni.
Counties. KW, TT.
Distribution. Kenya, Tanzania.

******Langelurillus holmi*** **Próchniewicz, 1994 (♂)**

L. h. Próchniewicz, 1994: 31.

Record. Diani Beach.
County. KW.
Distribution. Known only from the type locality.

******Langelurillus kenyaensis*** **Dawidowicz & Wesołowska, 2016 (♀)**

L. k. Dawidowicz and Wesołowska 2016: 448.

Record. Mount Elgon.
County. TZ.
Distribution. Known only from the type locality.

******Langelurillus primus*** **Próchniewicz, 1994**

L. p. Próchniewicz, 1994: 28; Dawidowicz and Wesołowska 2016: 448.

Records. Meru National Park (type locality), Lake Bogoria.
Counties. BR, ME.
Distribution. Kenya.

^*Langelurillus rufus* (de Lessert, 1925)

Langona rufa: di Caporiacco, 1949: 472.

Record. Mackinnon Road.
County. KW.
Distribution. Ethiopia, Kenya, Tanzania.

*__*Langelurillus spinosus* Próchniewicz, 1994 (♂)**

L. s. Próchniewicz, 1994: 31.

Record. Kikambala Beach.
County. KL.
Distribution. Known only from the type locality.

*__*Langona minima* di Caporiacco, 1949 (♀)**

L. m. di Caporiacco, 1949: 473.

Record. Nairobi.
County. NB.
Distribution. Known only from the type locality.

***Langona pecten* Próchniewicz & Hęciak, 1994 (♂)**

L. p. Próchniewicz and Hęciak 1994: 36.

Record. Mount Elgon.
County. TZ.
Distribution. Kenya, Tanzania, Zimbabwe.

***Menemerus bivittatus* (Dufour, 1831)**

M. b.: di Caporiacco 1949: 486.

Record. Mackinnon Road.
County. KW.
Distribution. Pantropical.

***Menemerus congoensis* Lessert, 1927**

M. c.: di Caporiacco 1949: 486.

Record. Mau.
County. NA.
Distribution. Sudan to South Africa.

******Menemerus formosus* Wesołowska, 1999**

M. f. Wesołowska, 1999: 292.

Record. Lake Turkana.
County. MS.
Distribution. Known only from the type locality.

******Menemerus niger* di Caporiacco, 1949**

M. n. di Caporiacco, 1949: 486.

Record. Nairobi.
County. NB.
Distribution. Known only from the type locality.
Note. Description based on a juvenile specimen and considered as *nomen dubium* by Wesołowska (1999) (WSC 2018).

^*Menemerus tropicus* Wesołowska, 2007

M. t. Wesołowska, 2007: 522.

Records. Mbita Point, Naivasha.
Counties. HB, NK.
Distribution. Kenya, Uganda.

***Mexcala agilis* Lawrence, 1928 (♂)**

M. a.: Wesołowska 2009: 153; Dawidowicz and Wesołowska 2016: 448.

Records. Diani Beach, Mount Elgon, Mombasa.
Counties. KW, MM, TZ.
Distribution. DR Congo, Kenya, Malawi, Tanzania, Namibia.

^*Mexcala signata* Wesołowska, 2009 (♀)

M. s. Wesołowska, 2009: 177.

Record. Nairobi Airport.
County. NB.
Distribution. Kenya, Tanzania.

^*Mikrus ugandensis* Wesołowska, 2001 (♂)

M. u. Wesołowska, 2001b: 586.

Record. Muthaiga.
County. NB.
Distribution. Kenya, Uganda.

***Myrmarachne dundoensis* Wanless, 1978**

M. d.: Wesołowska and Wiśniewski 2015: 555.

Record. Brodericks Falls.
County. BG.
Distribution. Angola, Kenya, Botswana.

*****Myrmarachne exultans* di Caporiacco, 1949 (♀)**

M. e. di Caporiacco, 1949: 462.

Record. Mau.
County. NA.
Distribution. Known only from the type locality.
Note. Considered as *nomen dubium* by Wanless (1978a).

***Myrmarachne giltayi* Roewer, 1965**

M. g.: Wanless 1978a: 36; Wesołowska and Wiśniewski 2015: 556.

Records. Lake Naivasha, Mount Elgon.
Counties. NK, TZ.
Distribution. DR Congo, Angola, Kenya.

***Myrmarachne ichneumon* Simon, 1886**

M. i.: Wanless 1978a: 56.

Records. Kilifi.
County. KL.
Distribution. Kenya, Tanzania, South Africa.

***Myrmarachne kiboschensis* de Lessert, 1925**

M. k.: Wanless 1978a: 78.

Record. Naro Moru.
County. NI.
Distribution. Botswana to Vietnam.

^*Myrmarachne kilifi* Wanless, 1978

M. k. Wanless, 1978a: 102.

Record. Kilifi.
County. KL.
Distribution. Kenya, Tanzania.

*****Myrmarachne kitale* Wanless, 1978**

M. k. Wanless, 1978a: 94.

Records. Kitale (type locality), Lake Naivasha, Naro Moru.
Counties. NI, NK, TZ.
Distribution. Kenya.

***Myrmarachne lawrencei* Roewer, 1965**

M. l.: Wanless 1978a: 32; Wesołowska and Wiśniewski 2015: 558.

Records. Mount Elgon, Cherangany Hills, Nairobi.
Counties. NB, TZ.
Distribution. Gabon, Congo, Kenya, Tanzania, Ethiopia.

***Myrmarachne lulengana* Roewer, 1965**

M. l.: Wanless 1978a: 33.

Record. Lake Naivasha.
County. NK.
Distribution. Ethiopia, DR Congo, Kenya, Botswana, South Africa.

***Myrmarachne marshalli* Peckham & Peckham, 1903**

M. m.: Wanless 1978a: 67.

Records. Nairobi, Kakamega, Takaungu.
Counties. KL, KK, NB.
Distribution. Africa.

***Myrmarachne militaris* Szombathy, 1913**

M. moerens: di Caporiacco, 1949: 461; *M. m.*: Wanless 1978a: 30.

Records. Elmentaita, Kitale, Mackinnon Road.
Counties. KW, NK, TZ.
Distribution. West, Central, East Africa.

***Myrmarachne melanotarsa* Wesołowska & Salm, 2002**

M. m. Wesołowska & Salm, 2002: 410.

Record. Mbita Point.
County. HB.
Distribution. Known only from the type locality.

***Myrmarachne naro* Wanless, 1978 (♂)**

M. n. Wanless, 1978a: 43; Warui et al. 2004: 20.

Record. Naro Moru.
County. NI.
Distribution. Known only from the type locality.

***Myrmarachne sansibarica* Strand, 1910**

M. s.: di Caporiacco 1949: 461.

Record. Nairobi.
County. NB.
Distribution. Kenya, Tanzania.
Note. Considered as *nomen dubium* by Wanless (1978a).

***Myrmarachne uvira* Wanless, 1978**

M. u. Wanless, 1978a: 86.

Record. Kilifi.

County. KL.

Distribution. A species widely distributed in Africa (Wesołowska and Russell-Smith 2011).

***Natta chionogaster* (Simon, 1901)**

N. chionogastra: Dawidowicz and Wesołowska 2016: 448.

Record. Mount Elgon.

County. TZ.

Distribution. Mainland Africa and Madagascar.

***Natta horizontalis* Karsch, 1879**

N. h.: Dawidowicz and Wesołowska 2016: 449.

Records. Mount Elgon, Mombasa.

Counties. MM, TZ.

Distribution. Africa, Yemen.

****Natta splendidissima* (di Caporiacco, 1949)**

Cyllobelus splendissimus di Caporiacco, 1949: 479.

Record. Nairobi.

County. NB.

Distribution. Known only from the type locality.

Note. Most likely, this species is a junior synonym of either *N. chionogaster* or *N. horizontalis*. Both species are known in Kenya. Considered as *nomen dubium* by Wesołowska (1993).

****Neaetha alborufula* di Caporiacco, 1949 (♂)**

N. a. di Caporiacco 1949: 476.

Record. Nairobi.

County. NB.

Distribution. Known only from the type locality.

***Neaetha catula* Simon, 1886**

N. c.: di Caporiacco 1949: 475.

Record. Mackinnon Road.
County. KW.
Distribution. East, Southern Africa.

****Pachyballus flavipes aurantius*** **di Caporiacco, 1949 (♀)**

P. f. a. di Caporiacco, 1949: 464.

Record. Mau Forest.
County. NA.
Distribution. Known only from the type locality.

Pachyballus flavipes flavipes **Simon, 1910**

P. f. f.: di Caporiacco 1949: 464; *P. f.*: Dawidowicz and Wesołowska 2016: 449.

Records. Amboseli, Diani Beach, Mount Elgon, Elmenteita.
Counties. KJ, KW, NK, TZ.
Distribution. Africa.

^*Pellenes dahli* **de Lessert, 1915**

P. d.: Dawidowicz and Wesołowska 2016: 449.

Record. Elgon.
County. TZ.
Distribution. Kenya, Uganda.

****Pellenes obvolutus*** **Dawidowicz & Wesołowska, 2016**

P. o. Dawidowicz & Wesołowska, 2016: 450.

Record. Mount Elgon.
County. TZ.
Distribution. Known only from the type locality.

Phintella aequipes **(Peckham & Peckham, 1903)**

P. a.: Dawidowicz and Wesołowska 2016: 451.

Records. Elgon, Kakamega Forest.
Counties. KK, TZ.
Distribution. Africa.

***_Phintella kaptega_ Dawidowicz & Wesołowska, 2016**

P. k. Dawidowicz and Wesołowska 2016: 452.

Record. Mount Elgon.
County. TZ.
Distribution. Known only from the type locality.

^_Phintella lucida_ Wesołowska & Tomasiewicz, 2008

P. l.: Dawidowicz and Wesołowska 2016: 452.

Records. Mount Elgon, Tsavo West National Park.
Counties. TT, TZ.
Distribution. Ethiopia, Kenya.

***_Phlegra crumena_ Próchniewicz & Heciak, 1994 (♀)**

P. c. Próchniewicz and Heciak 1994: 37.

Record. Mount Elgon.
County. TZ.
Distribution. Known only from the type locality.

***_Phlegra levis_ Próchniewicz & Heciak, 1994 (♀)**

P. l. Próchniewicz and Heciak 1994: 37.

Record. Mount Debasien (Now Mount Kadam).
County. TZ.
Distribution. Known only from the type locality.

***Phlegra nuda* Próchniewicz & Hęciak, 1994**

P. n. Próchniewicz and Hęciak 1994: 37; Logunov and Azarkina 2006: 735.

Record. Cherangany Hills.
County. TZ.
Distribution. Ethiopia, Kenya, Tanzania, Uganda, Zimbabwe.

***Phlegra tristis* de Lessert, 1927**

P. t.: di Caporiacco 1949: 372; Logunov and Azarkina 2006: 744.

Records. Garse, Nairobi.
Counties. NB, WJ.
Distribution. DR Congo, Kenya.

^*Plexippus auberti* de Lessert, 1925

P. a.: Wesołowska 2012: 213; Dawidowicz and Wesołowska 2016: 453.

Records. Cherangany Hills, Mount Elgon, Mbita Point.
Counties. HB, TZ.
Distribution. Kenya, Tanzania.

***Plexippus fibulatus* Dawidowicz & Wesołowska, 2016 (♂)**

P. f. Dawidowicz and Wesołowska 2016: 454.

Record. Mount Elgon.
County. TZ.
Distribution. Known only from the type locality.

***Plexippus paykulli* (Audouin, 1826)**

P. p.: di Caporiacco 1949: 470.

Record. Mackinnon Road.
County. KW.
Distribution. Pantropical.

***Portia schultzi* Karsch, 1878**

P. schultzii: Wanless, 1978b: 88

Record. Kilifi.
County. KL.
Distribution. Central, East, Southern Africa, Mayotte, Madagascar.

^*Pseudicius athleta* Wesołowska, 2011

P. a. Wesołowska, 2011: 485.

Record. Mbita Point.
County. HB.
Distribution. Uganda, Kenya.

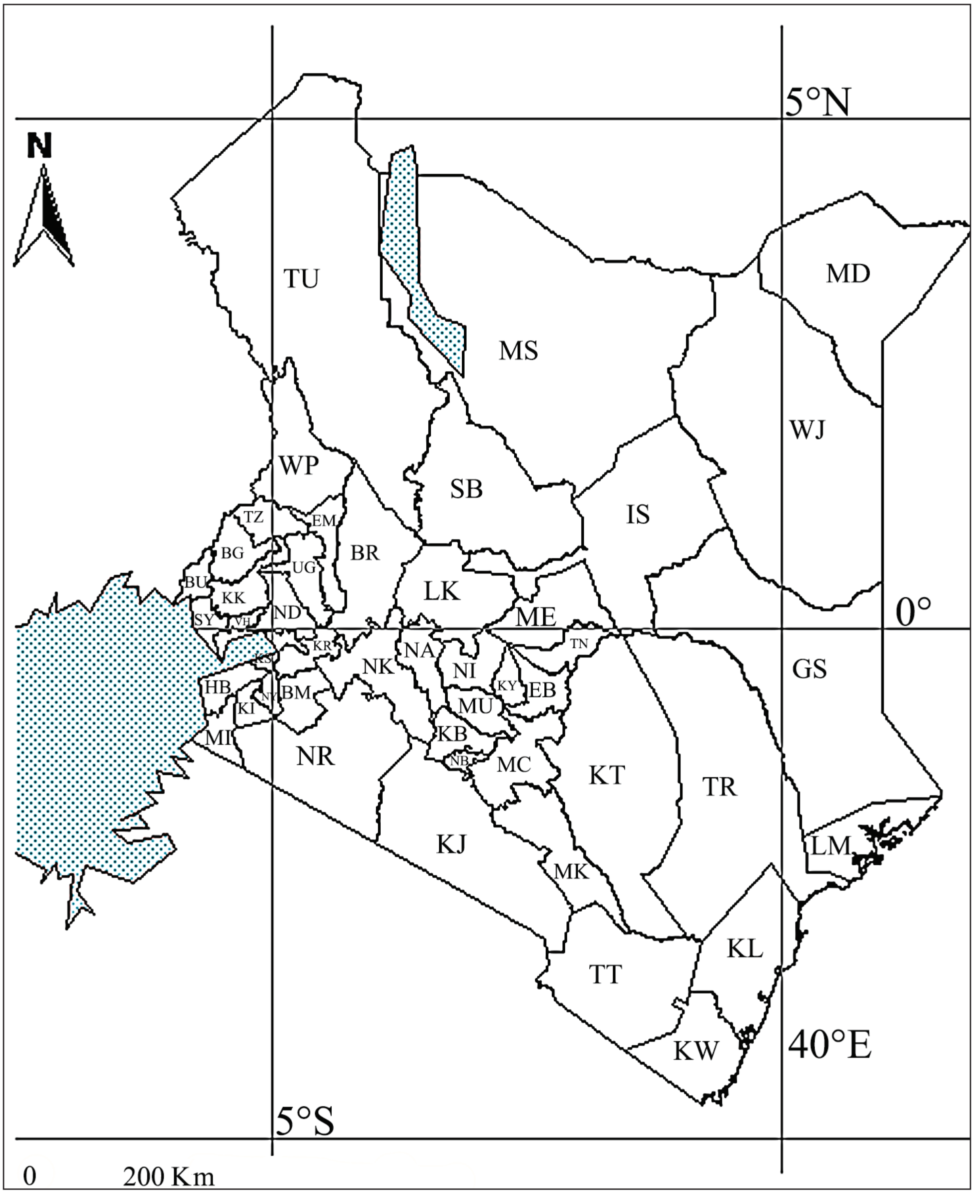

Figure 1. Map showing the 47 Counties in Kenya. BM–Bomet, BG–Bungoma, BR–Baringo, BU–Busia, EB–Embu, EM–Elgeyo Marakwet, GS–Garissa, HB–Homa Bay, IS– Isiolo, KB–Kiambu, KI–Kisii, KJ–Kajiado, KK–Kakamega, KL–Kilifi, KR–Kericho, KS–Kisumu, KT–Kitui, KW–Kwale, KY–Kirinyaga, LK–Laikipia, LM–Lamu, MC–Machakos, MD–Mandera, ME–Meru, MI–Migori, MK–Makueni, MM–Mombasa, MS–Marsabit, MU–Murang'a, NA–Nyandarua, NB–Nairobi, ND–Nandi, NI–Nyeri, NK–Nakuru, NR–Narok, NY–Nyamira, SB–Samburu, SY–Siaya, TN–Tharaka Nithi, TR–Tana River, TT–Taita-Taveta, TU–Turkana, TZ–Trans Nzoia, UG–Uasin Gishu, WJ–Wajir, WP–West Pokot, VH–Vihiga.

******Pseudicius elmenteitae* **di Caporiacco, 1949 (♀)**

P. e. di Caporiacco, 1949: 483.

Record. Nairobi.
County. NB.
Distribution. Known only from the type locality.

Rafalus lymphus **(Próchniewicz & Heciak, 1994) (♂)**

Aelurillus l. Próchniewicz and Heciak 1994: 34.

Record. Lake Paradise.
County. MS.
Distribution. Kenya, Tanzania, Ethiopia, Yemen.

******Ragatinus maddisoni* **Dawidowicz & Wesołowska, 2016**

R. m. Dawidowicz and Wesołowska 2016: 455.

Records. Mount Kenya (type type locality), Aberdare Range.
Counties. NA, TN.
Distribution. Kenya.

Rhene capensis **Strand, 1909 (♀)**

R. c.: di Caporiacco 1949: 485.

Record. Mau.
County. NA.
Distribution. Kenya, South Africa.
Note. Identification based on a juvenile specimen and should refer to other species. *Rhene capensis* is known by single taxonomic entry from South Africa, known by female and its description is not accompanied by any figures (WSC 2018).

******Rhene kenyaensis* **Wesołowska & Dawidowicz, 2014 (♂)**

R. k. Wesołowska and Dawidowicz 2014: 75.

Record. Shimba Hills.
County. KW.
Distribution. Known only from the type locality.

Rhene lingularis **Haddad & Wesołowska, 2011 (♂)**

R. l.: Dawidowicz and Wesołowska 2016: 456.

Record. Naivasha.
County. NK.
Distribution. Kenya, South Africa.

*****Rhene mombasa*** **Wesołowska & Dawidowicz, 2014 (♀)**

R. m. Wesołowska and Dawidowicz 2014: 75.

Records. Bamburi, Diani Beach (type locality).
Counties. KW, MM.
Distribution. Kenya.

Sibianor kenyaensis **Logunov, 2001**

S. k. Logunov, 2001: 268.

Record. Kilifi.
County. KL
Distribution. Botswana, Kenya.

Sibianor victoriae **Logunov, 2001**

S. v. Logunov, 2001: 276.

Record. Naivasha shrubs.
County. NK.
Distribution. Kenya, South Africa.

****Stenaelurillus albopunctatus*** **di Caporiacco, 1949**

S. a. di Caporiacco, 1949: 474; Wesołowska 2014: 597; Logunov and Azarkina 2018: 17.

Record. Nairobi (type locality), Elmenteita, Naivasha.
Counties. NB, NK.
Distribution. Kenya.

^*Stenaelurillus darwini* **Wesołowska & Russell-Smith, 2000**

S. d. Wesołowska and Russell-Smith 2000: 98; Wesołowska 2014: 598.

Records. Kwale, Mount Kisigau.
County. KW.
Distribution. Kenya, Tanzania.

^*Stenaelurillus mirabilis* Wesołowska & Russell-Smith, 2000

S. m.: Logunov and Azarkina 2018: 78.

Records. Taita Discovery Centre.
County. TT.
Distribution. Kenya, Tanzania.

^*Stenaelurillus strandi* di Caporiacco, 1939 (♂)

S. s. di Caporiacco, 1939: 374.

Record. Moyale.
County. MS.
Distribution. WSC (2018) indicates Ethiopia, but it seems that it occurs in Kenya and Ethiopia.

***Stenaelurillus uniguttatus* de Lessert, 1925**

S. u.: Dawidowicz and Wesołowska 2016: 456.

Record. Mount Elgon.
County. TZ.
Distribution. Ethiopia, Tanzania, Kenya.

****Thiratoscirtus elgonensis* Dawidowicz & Wesołowska, 2016**

T. e. Dawidowicz and Wesołowska 2016: 456.

Record. Mount Elgon.
County. TZ.
Distribution. Known only from the type locality.

****Thiratoscirtus minimus* Dawidowicz & Wesołowska, 2016**

T. m. Dawidowicz and Wesołowska 2016: 458.

Record. Kakamega Forest.
County. KK.
Distribution. Known only from the type locality.

Thyene bucculenta **(Gerstaecker, 1873) (♂)**

Phidippus bucculentus Gerstaecker, 1873: 475; *T. b.*: di Caporiacco 1949: 471.

Records. Mombasa (Type locality), Elmenteita, Mackinnon Road.
Counties. KW, MM, NK.
Distribution. Eastern and Southern Africa.

Thyene coccineovittata **(Simon, 1886)**

T. c.: Dawidowicz and Wesołowska 2016: 458.

Record. Mombasa.
County. MM.
Distribution. West, South Africa, East Africa; France.

Thyene imperialis **(Rossi, 1846)**

T. i.: Dawidowicz and Wesołowska 2016: 458.

Record. Mount Elgon.
County. TZ.
Distribution. Southern Palaearctic, East Africa and South Asia.

Thyene inflata **(Gerstaecker, 1873)**

Phidippus inflatus Gerstaecker, 1873: 476; *T. i.*: di Caporiacco 1940: 863.

Record. Wanga.
County. KK.
Distribution. Africa, Madagascar.

Thyene leighi **Peckham & Peckham, 1903 (♂)**

T. l.: Dawidowicz and Wesołowska 2016: 460.

Records. Nairobi, Elgon.
Counties. NB, TZ.
Distribution. Kenya, Zimbabwe, South Africa.

Thyene natalii **Peckham & Peckham, 1903**

T. n.: Dawidowicz and Wesołowska 2016: 461.

Record. Elgon.
County. TZ.
Distribution. Ethiopia, Kenya, Mozambique, Zimbabwe, South Africa.

******Thyene nigriceps*** **(di Caporiacco, 1949) (♀)**

Paramodunda n. di Caporiacco, 1949: 470.

Record. Nairobi.
County. NB.
Distribution. Known only from the type locality.

^ ***Thyene ogdeni nyukiensis*** **de Lessert, 1925**

T. o. n.: di Caporiacco 1949: 472.

Record. Nairobi.
County. NB.
Distribution. Tanzania, Kenya.

^ ***Thyene orbicularis*** **(Gerstaecker, 1873) (♂)**

T. o.: di Caporiacco 1939: 376.

Record. Moyale.
County. MS.
Distribution. East Africa.

^ ***Thyene splendida*** **di Caporiacco, 1939 (♂)**

T. s.: di Caporiacco 1949: 471.

Record. Nairobi.
County. NB.
Distribution. Ethiopia, Kenya.

^ ***Thyene subsplendens*** **di Caporiacco, 1947 (♀)**

T. s.: di Caporiacco 1949: 472.

Records. Elmenteita, Mackinnon Road.
Counties. KW, NK.
Distribution. East Africa.

^*Thyene striatipes* (di Caporiacco, 1939)

Paramodunda s.: di Caporiacco, 1949: 470

Records. Elmenteita, Nairobi.
Counties. NB, NK.
Distribution. East Africa.

***Thyene thyenioides* (de Lessert, 1925)**

Parmodunda t.: di Caporiacco, 1949: 470; *T. t.*: Dawidowicz and Wesołowska 2016: 461.

Records. Elgon, Mau, Nairobi.
Counties. NA, NB, TZ.
Distribution. Africa.

***Tomomingi holmi* (Prószyński & Żabka, 1983)**

T. h. Prószyński and Żabka 1983: 572; Szűts and Scharff 2009: 1364.

Records. Aberdare Mountains (type locality), Mount Kenya.
Counties. NA, TN.
Distribution. Kenya.

***Tomomingi keinoi* (Prószyński & Żabka, 1983)**

Tomocyrba k. Prószyński and Żabka 1983: 571; *T. k.*: Szűts and Scharff 2009: 1366.

Record. Mount Elgon.
County. TZ.
Distribution. Known only from the type locality.

***Tomomingi kikuyu* (Prószyński & Żabka, 1983)** (♂)

Tomocyrba k. Prószyński and Żabka 1983: 572; *T. k.*: Szűts and Scharff 2009: 1364.

Record. Kikiuyu Escarpment.
County. NA.
Distribution. Known only from the type locality.

^*Tomomingi sjostedti* de Lessert, 1925

T. t.: Dawidowicz and Wesołowska 2016: 463.

Record. Mount Kulal.
County. MS.
Distribution. Kenya, Tanzania.

***Tusitala barbata* Peckham & Peckham, 1902**

T. b.: di Caporiacco 1940: 868; Dawidowicz and Wesołowska 2016: 464.

Records. Mount Elgon, Kakamega Forest.
Counties. KK, TZ.
Distribution. West, East, Southern Africa.
Note. di Caporiacco (1940) mentioned that this species occurring in Kenya only in a distribution note without providing any data. This species was known at that time only from South Africa.

***Tusitala lyrata* (Simon, 1903)**

T. l.: Dawidowicz and Wesołowska 2016: 464.

Record. Mount Elgon.
County. TZ.
Distribution. Africa.

Scytodidae Blackwall, 1864

***Scytodes leprosula* Strand, 1913**

S. l.: di Caporiacco 1949: 326.

Records. Mackinnon Road, Nairobi.
Counties. KW, NB.
Distribution. Central, East Africa.

Segestriidae Simon, 1893

^*Ariadna brevispina* di Caporiacco, 1947 (♀)

A. b.: di Caporiacco 1949: 328.

Record. Mau.
County. NA.
Distribution. Kenya, Tanzania.

^*Ariadna kibonotensis* Tullgren, 1910 (♀)

A. k.: di Caporiacco 1949: 328.

Record. Nairobi.
County. NB.
Distribution. Kenya, Tanzania.

Selenopidae Simon, 1897

***Selenops lumbo* Corronca, 2001: 55**

S. l.: Corronca 2002: 22.

Records. 17 km S of Maktau, Kibwezi.
Counties. MK, TT.
Distribution. Kenya, Mozambique.

***Selenops radiatus* Latreille, 1819**

S. r.: di Caporiacco 1949: 449.

Record. Mackinnon Road.
County. KW.
Distribution. Mediterranean, Africa, India, Myanmar, China.

***Selenops vigilans* Pocock, 1898**

S. werneri: Berland, 1922: 62; *S. v.*: di Caporiacco 1949: 449; Benoit 1968: 136; Corronca 2002: 29.

Records. Giriama, Mount Kenya, Athi River, 24 km SW of Nairobi, Nairobi, Mount Loroghi.
Counties. KL, MC, NB, SB, TN.
Distribution. West, Central, East Africa, Madagascar.

***_Selenops viron_ Corronca, 2002 (♀)**

S. v. Corronca, 2002: 30.

Record. Kanapoi.
County. TU.
Distribution. Known only from the type locality.

Sicariidae Keyserling, 1880

Loxosceles meruensis Tullgren, 1910

L. m.: Lotz 2012: 22.

Record. Meru.
County. ME.
Distribution. Ethiopia, Kenya, Tanzania.
Note. Although Lotz (2012) indicated that it was described from Kenya; judging from Tullgren's (1910) publication, its type locality is Tanzania.

^*Loxosceles neuvillei* Simon, 1909 (♀)

L. n.: Lotz 2012: 22.

Record. No precise records.
County. K.
Distribution. Ethiopia, Somalia, Kenya.

^*Loxosceles pallidecolorata* (Strand, 1906) (♀)

Loxoscella p. Strand, 1906: 668.

Records. Elmenteita, Nairobi.
Counties. NB, NK.
Distribution. Ethiopia, Kenya.

Loxosceles smithi Simon, 1897

L. s.: Lotz 2017: 489.

Records. 50 km southwest of Nairobi, Tiwi Beaches, Teita Province.
Counties. KW, NB, TT.
Distribution. Ethiopia, Malawi, Kenya, Tanzania.

Sparassidae Bertkau, 1872

Eusparassus vestigator Simon, 1897

E. v.: Moradmand 2013: 44.

Records. Northern Turkana, Lake Baringo, Mangu.
Counties. BR, KB, TU.

Distribution. Eastern Africa.

***Heteropoda venatoria* (Linnaeus, 1767)**

Olios regius Gerstaecker, 1873: 482; *H. v.*: Pocock 1898c: 519; di Caporiacco 1949: 449.

Records. Changamwe, Mombasa, Nairobi, Taveta.
Counties. NB, MM, TT.
Distribution. Tropical Asia. Introduced to Pacific Is., North, Central and South America, Macaronesia, Europe, Africa.

^*Olios chiracanthiformis* (Strand, 1906) (♀)

O. c.: di Caporiacco 1941: 123.

Record. Elolo.
County. MS.
Distribution. Ethiopia, Kenya.

^*Olios quesitio* Moradmand, 2013

Eusparassus concolor: di Caporiacco, 1939: 353.

Record. Moyale.
County. MS.
Distribution. Ethiopia, Kenya.
Note. The species described, based on a juvenile specimen.

^*Palystes hoehneli* Simon, 1890

P. h.: Croeser 1996: 70.

Record. Mount Kenya.
County. LK.
Distribution. Kenya, Tanzania.

***Pseudomicrommata longipes* (Bösenberg & Lenz, 1895)**

P. l.: Moradmand 2015: 429.

Record. Kibwezi.
County. MK.
Distribution. Africa.

Telemidae Fage, 1913

Apneumonella taitatavetaensis* **Zhao & Li, 2017

A. t. Zhao and Li, in Song et al. 2017: 7.

Record. Taita Hills.
County. TT.
Distribution. Known only from the type locality.

Guhua kakamegaensis* **Zhao & Li, 2017

G. k. Zhao and Li, in Song et al. 2017: 3.

Record. Kakamega Forest.
County. KK.
Distribution. Known only from the type locality.

Tetrablemmidae O. Pickard-Cambridge, 1873

Hexablemma cataphractum* **Berland, 1920 (♂)

H. c. Berland, 1920b: 167; Simon and Fage 1922: 542; *Tetrablemma c.*: Shear, 1978: 12; *H. c.*: Lehtinen 1981: 72.

Records. Kikuyu: Blue Post Hotel (type locality), Mount Kenya, Shimoni Caves.
Counties. KB, KY, KW.
Distribution. Kenya.

Tetragnathidae Menge, 1866

^*Leucauge amanica* Strand, 1907

L. a.: di Caporiacco 1949: 347.

Record. Mau.
County. NA.
Distribution. East Africa.

^*Leucauge brevitibialis* Tullgren, 1910

L. b.: di Caporiacco 1949: 346.

Records. Nairobi, Mau Range.

Counties. NA, NB.
Distribution. Kenya, Tanzania.

^*Leucauge camelina* di Caporiacco, 1940 (♀)

L. c.: di Caporiacco 1949: 347.

Record. Mau.
County. NA.
Distribution. Ethiopia, Kenya.

Leucauge festiva (Blackwall, 1866)

L. f.: di Caporiacco 1939: 340; 1949: 347.

Records. Moyale, Nairobi.
Counties. MS, NB.
Distribution. Africa.

^*Leucauge kibonotensis* Tullgren, 1910

L. k.: di Caporiacco 1949: 346.

Records. Mau, Nairobi.
Counties. NA, NB.
Distribution. Kenya, Tanzania.

Leucauge levanderi (Kulczyński, 1901)

L. l.: di Caporiacco 1949: 347.

Records. Elmenteita, Kabete, Nairobi.
Counties. KB, NB, NK.
Distribution. Ethiopia, Congo, Kenya, South Africa.

^*Leucauge medjensis* de Lessert, 1930 (♀)

L. metschensis: di Caporiacco, 1949: 347.

Records. Mackinnon Road, Nairobi.
Counties. KW, NB.
Distribution. DR Congo, Kenya.

^*Leucauge meruensis* Tullgren, 1910

L. m.: di Caporiacco 1949: 346.

Record. Mau.
County. NA.
Distribution. Kenya, Tanzania.

***Leucauge ungulata* (Karsch, 1879)**

Meta u.: Pocock 1898c: 513.

Record. Taru.
County. KJ.
Distribution. West, East Africa, Equatorial Guinea (Bioko), São Tomé and Príncipe.

^*Metellina merianopsis* (Tullgren, 1910) (♀)

Meta m.: di Caporiacco, 1949: 404.

Records. Mackinnon Road, Mau.
Counties. KW, NA.
Distribution. Kenya, Tanzania.

^*Metellina meruensis* (Tullgren, 1910)

Meta m.: di Caporiacco, 1949: 404.

Record. Mau.
County. NA.
Distribution. Kenya, Tanzania.

^*Pachygnatha mucronata* Tullgren, 1910

P. m.: di Caporiacco 1949: 351; Bosmans and Bosselaers 1994: 327.

Record. Mau Range.
County. NA.
Distribution. Tanzania, Kenya.
Note. Bosmans and Bosselaers (1994) found di Caporiacco's description doubtful as it was based on Tullgren's (1910: 147) description of the female without examination of the vulva. They suggested that the species recorded by di Caporiacco probably belongs to *P. procincta*.

^*Pachygnatha palmquisti* Tullgren, 1910

P. p.: Bosmans and Bosselaers 1994: 327.

Record. Eldoret.
County. UG.
Distribution. Kenya, Tanzania.

***Pachygnatha procincta* Bosmans & Bosselaers, 1994**

P. p. Bosmans & Bosselaers, 1994: 337.

Records. Mau Escarpment, Timboroa.
Counties. BR, NA.
Distribution. Cameroon, Burundi, Kenya.

***Pachygnatha zappa* Bosmans & Bosselaers, 1994**

P. z. Bosmans & Bosselaers, 1994: 332.

Record. Mount Elgon.
County. TZ.
Distribution. Cameroon, Kenya, Malawi, South Africa.

^*Sancus bilineatus* Tullgren, 1910

S. b.: Kuntner and Álvarez-Padilla 2006: 119.

Record. Mount Kenya.
County. LK.
Distribution. Kenya, Tanzania.

***Tetragnatha boydi* O. Pickard-Cambridge, 1898**

T. b.: di Caporiacco 1949: 347.

Record. Mau.
County. NA.
Distribution. Mexico to Brazil, Africa, Seychelles, India to China.

^*Tetragnatha brachychelis* di Caporiacco, 1947

T. b. di Caporiacco, 1947: 145; 1949: 348.

Records. Mau, Voi.
Counties. NA, TT.
Distribution. Kenya, Tanzania.

Tetragnatha jaculator Tullgren, 1910

T. j.: di Caporiacco 1949: 348.

Record. Nairobi.
County. NB.
Distribution. Africa to China, New Guinea. Introduced to Barbados, Trinidad.

**Tetragnatha kolosvaryi* di Caporiacco, 1949

T. k. di Caporiacco, 1949: 349.

Records. Elmenteita (type locality), Nairobi, Mau Range.
Counties. NA, NB, NK.
Distribution. Kenya.

^*Tetragnatha latro* Tullgren, 1910

T. l.: di Caporiacco 1949: 348.

Records. Elmenteita, Nairobi.
Counties. NB, NK.
Distribution. Kenya, Tanzania.

**Tetragnatha roeweri* di Caporiacco, 1949 (♂)

T. röweri di Caporiacco, 1949: 348.

Record. Mau Range.
County. NA.
Distribution. Known only from the type locality.

Theraphosidae Thorell, 1869

^*Eucratoscelus constrictus* (Gerstaecker, 1873)

Harpactira constricta Gerstaecker, 1873: 486; *E. longiceps*: Pocock 1898c: 500; *E. c.*: Gallon 2002: 227.

Records. Mbuyuni, Voi, Dschagga, Taveta.

Counties. MM, TT.
Distribution. Kenya, Tanzania.

^*Pelinobius muticus* Karsch, 1885

P. m. Karsch, 1885: 134; *Phoneyusa gregori* Pocock, 1897: 761; *Phoneyusa bettoni* Pocock, 1898c: 503; *Citharischius crawshayi* Pocock, 1900: 493; *Phoneyusa rufa*: Berland 1932: 273; *P. m.*: Gallon 2010: 44.

Records. Iveti Mountains: Kilungu, Voi, Kenani, Kibwezi, Tsavo National Park, Amboseli and Mombasa.
Counties. KJ, MC, MK, TT.
Distribution. Tanzania, Kenya.

****Pterinochilus alluaudi* Berland, 1914**

P. a. Berland, 1914: 46; 1932: 273; Smith 1990: 94; Gallon 2002: 205.

Record. Maji ya Chumvi.
County. KW.
Distribution. Known only from the type locality.

****Pterinochilus andrewsmithi* Gallon, 2009 (♀)**

P. a. Gallon, 2009: 363.

Record. Northern Turkana.
County. TU.
Distribution. Known only from the type locality.

***Pterinochilus chordatus* (Gerstaecker, 1873)**

Harpactira chordata Gerstaecker, 1873: 487; *P. affinis*: di Caporiacco 1949: 322; *P. c.*: Gallon 2002: 206.

Records. Nairobi, Lake Nakuru, Massai Mara Game Reserve, Tsavo National park, Amboseli, Naivasha, Taita Taveta.
Counties. NK, NR, KJ, TT.
Distribution. Eastern Africa.

***Pterinochilus murinus* Pocock, 1897**

P. m.: Pocock 1898c: 501; Gallon 2002: 21.

Records. Hunter's Lodge Hotel, Taru Desert, Taveta Forest, Mombasa, Lake Victoria, Mbuyuni, Manjewa, Fort Hall, Tsavo East National Park.

Counties. HB, KB, KJ, MM, TT.

Distribution. Central, East, Southern Africa.

**Pterinochilus raygabrieli* Gallon, 2009 (♂)

P. r. Gallon, 2009: 361.

Record. Mount Thatha.

County. KT.

Distribution. Known only from the type locality.

Theridiidae Sundevall, 1833

**Anelosimus monskenyensis* Agnarsson, 2006

A. m. Agnarsson, in Agnarsson and Zhang 2006: 16.

Record. Mount Kenya.

County. TN.

Distribution. Known only from the type locality.

Argyrodes argyrodes (Walckenaer, 1841)

Conopista gibbosa: di Caporiacco 1949: 400.

Record. Nairobi.

County. NB.

Distribution. Mediterranean to West Africa, Seychelles, Kenya.

**Argyrodes exlineae* (di Caporiacco, 1949) (♀)

Conopistha exlinae di Caporiacco, 1949: 400; *A. e.*: Brignoli 1983: 393.

Record. Kabete.

County. KB.

Distribution. Known only from the type locality.

**Argyrodes kratochvili* (di Caporiacco, 1949) (♀)

Conopistha k. di Caporiacco, 1949: 402; *A. k.*: Brignoli 1983: 393.

Records. Nairobi (type locality), Elmenteita.

Counties. NB, NK.
Distribution. Kenya.

***Argyrodes zonatus* (Walckenaer, 1841)**

A. z.: Berland 1920b: 141.

Record. Taveta.
County. TT.
Distribution. Equatorial Guinea (Bioko), East Africa, Madagascar, Réunion, Mayotte.

*****Ariamnes jeanneli* Berland, 1920 (♀)**

A. j. Berland, 1920b: 139.

Record. Ramisi.
County. KW.
Distribution. Known only from the type locality.

***Coleosoma blandum* O. Pickard-Cambridge, 1882**

C. b.: Caporiacco 1949: 396.

Record. Nairobi.
County. NB.
Distribution. Known from Seychelles to Japan (WSC 2018). Record from Kenya is north-westernmost in the range.

^*Crustulina incerta* Tullgren, 1910

C. i.: Berland 1920b: 170; di Caporiacco 1949: 375.

Records. Mount Kenya, Mau, Nairobi.
Counties. NA, NB, NI.
Distribution. Kenya, Tanzania.

*****Crustulina jeanneli* Berland, 1920**

C. j. Berland, 1920b: 170.

Record. Naivasha.
County. NK.
Distribution. Known only from the type locality.

******Crustulina obesa*** **Berland, 1920**

C. o. Berland, 1920b: 173; di Caporiacco 1949: 376.

Records. Kikuyu: Kijabe (type locality), Nairobi.
Counties. KB.
Distribution. Kenya.

******Dipoena bristowei*** **di Caporiacco, 1949**

D. b. di Caporiacco, 1949: 377.

Record. Nairobi.
County. NB.
Distribution. Known only from the type locality and by a juvenile specimen.

******Dipoena quadricuspis*** **di Caporiacco, 1949 (♀)**

D. q. di Caporiacco, 1949: 378.

Record. Nairobi.
County. NB.
Distribution. Known only from the type locality.

******Episinus hickmani*** **di Caporiacco, 1949**

E. h. di Caporiacco, 1949: 398.

Record. Mau Range.
County. NA.
Distribution. Known only from the type locality and by a juvenile specimen.

Euryopis bifascigera **Strand, 1913 (♀)**

E. b.: di Caporiacco 1949: 400.

Record. Elmenteita.
County. NK.
Distribution. Central, East Africa.

Latrodectus cinctus **Blackwall, 1865**

L. c.: Berland 1920b: 166; di Caporiacco 1949: 376.

Records. Elmenteita, Naivasha.
County. NK.
Distribution. Cape Verde Is., Africa, Kuwait, Iran.

***Latrodectus geometricus* C.L. Koch, 1841**

L. g.: Berland 1920b: 166. *L. g. geometricus*: di Caporiacco 1949: 376; *L. g. subalbicans* di Caporiacco, 1949: 376; *L. g. modestus*: di Caporiacco, 1949: 376; *L. g. obscuratus*: di Caporiacco, 1949: 377.

Records. Nairobi, Naivasha, Kabete, Mackinnon Road.
Counties. KB, KW, NB, NK.
Distribution. Africa. Introduced to many parts of the world.

***Latrodectus tredecimguttatus* (Rossi, 1790)**

L. t. lugubris: di Caporiacco 1949: 376.

Records. Mackinnon Road.
County. KW.
Distribution. Mediterranean to China. Also recorded in Kenya.

***Moneta spinigera* O. Pickard-Cambridge, 1871**

M. s.: Berland 1920b: 147.

Record. Mount Kenya: Amboni.
County. KY.
Distribution. Africa, Asia.

^*Phoroncidia kibonotensis kibonotensis* (Tullgren, 1910)

P. k. k.: di Caporiacco 1949: 374.

Records. Mau Range.
County. NA.
Distribution. Kenya, Tanzania.

****Phoroncidia kibonotensis concolor* (di Caporiacco, 1949) (♀)**

Ulesanis k. c. di Caporiacco, 1949: 374; *P. k.*: Brignoli 1983: 409.

Record. Mau Range.
County. NA.

Distribution. Known only from the type locality.

Platnickina kijabei (Berland, 1920)

Theridion k. Berland, 1920b: 153.

Record. Kijabe (type locality).
County. NA.
Distribution. Cape Verde Islands, Kenya.

Rhomphaea nasica (Simon, 1873)

R. argenteola: Berland 1920b: 144; *R. a. argenteola* and *R. a. nasica*: di Caporiacco, 1949: 403.

Records. Mount Kenya, Amboni, Mau.
Counties. KY, NA.
Distribution. Canary Islands, Portugal, Spain, France, Italy, Croatia, Greece, Africa, St. Helena.

^*Rhomphaea sjostedti* Tullgren, 1910 (♀)

R. s.: Berland 1920b: 146.

Record. Mount Kenya: Amboni.
County. KY.
Distribution. Kenya, Tanzania.

Steatoda paykulliana (Walckenaer, 1806)

Lithyphantes payullianus: di Caporiacco 1949: 375.

Record. Nairobi.
County. NB.
Distribution. Europe, Mediterranean to Central Asia, Kenya.
Note. Record is based on a subadult female, and most likely record refers to other species.

Steatoda rubrocalceolata (Simon, 1907) (♀)

Lithyphantes rubrocalceolatus: Berland 1920b: 178; di Caporiacco 1949: 375.

Records. Nairobi, Naivasha, Mount Kenya: Burgurett, Amboni, Mau: Molo.
Counties. KY, NA, NB, NK.
Distribution. Equatorial Guinea (Bioko), Kenya.

^*Steatoda singoides* (Tullgren, 1910)

Teutana s.: Berland 1920b: 176; di Caporiacco 1949: 375.

Records. Mau, Nairobi.
Counties. NA, NB.
Distribution. Kenya, Tanzania.

^*Steatoda tigrina* (Tullgren, 1910)

S. t.: di Caporiacco 1949: 375.

Records. Mount Kenya, Mau.
Counties. NA, NI.
Distribution. Kenya, Tanzania.

^*Steatoda tristis* (Tullgren, 1910)

S. t.: Warui et al. 2004: 20.

Record. Mpala Ranch.
County. LK.
Distribution. Kenya, Tanzania.

^*Steatoda variabilis* (Berland, 1920)

Teutana v. Berland, 1920b: 176; di Caporiacco 1949: 375.

Records. Naivasha, Mau, Mbuyuni.
Counties. MM, NA, NK.
Distribution. Kenya, Tanzania.

****Theridion angusticeps* di Caporiacco, 1949** (♀)

Theridium a. di Caporiacco, 1949: 388.

Records. Mau Range.
County. NA.
Distribution. Known only from the type locality.

^*Theridion banksi* Berland, 1920

T. b. Berland, 1920b: 160; *Theridium b.*: di Caporiacco 1949: 386.

Records. Kijabe (type locality), Mount Kenya: Amboni.
Counties. KB, KY.
Distribution. Kenya, Tanzania.

******Theridion brunneonigrum*** **di Caporiacco, 1949 (♀)**

Theridium b. di Caporiacco, 1949: 380.

Record. Mau Range.
County. NA.
Distribution. Known only from the type locality.

^*Theridion bullatum* **Tullgren, 1910 (♂)**

Theridium b.: di Caporiacco 1949: 386.

Record. Nairobi.
County. NB.
Distribution. Kenya, Tanzania.

******Theridion chamberlini*** **di Caporiacco, 1949 (♀)**

Theridium c. di Caporiacco, 1949: 391.

Record. Mau Range.
County. NA.
Distribution. Known only from the type locality.

******Theridion charitonowi*** **di Caporiacco, 1949 (♀)**

Theridium c. di Caporiacco, 1949: 383.

Record. Mau Range.
County. NA.
Distribution. Known only from the type locality.

^*Theridion clypeatellum* **Tullgren, 1910**

T. c.: Berland 1920b: 158; *Theridium c.*: di Caporiacco 1949: 385.

Records. Londiani, Mau, Naivasha.
Counties. KR, NA, NK.
Distribution. Kenya, Tanzania.

****Theridion comstocki* Berland, 1920 (♀)**

T. c. Berland, 1920b: 162.

Record. Kijabe.
County. KB.
Distribution. Known only from the type locality.

****Theridion convexisternum* di Caporiacco, 1949**

Theridium c. di Caporiacco, 1949: 393.

Record. Mau Range.
County. NA.
Distribution. Known only from the type locality.

****Theridion emertoni* Berland, 1920 (♀)**

T. e. Berland, 1920b: 157; *Theridium e.*: di Caporiacco 1949: 384.

Records. Nairobi, Ramisi (type locality).
Counties. KW, NB.
Distribution. Kenya.

****Theridion femoratissimum* di Caporiacco, 1949 (♂)**

Theridium f. di Caporiacco, 1949: 387.

Record. Mau Range.
County. NA.
Distribution. Known only from the type locality.

^*Theridion kibonotense* Tullgren, 1910 (♀)

Theridium k.: di Caporiacco 1949: 385.

Record. Mau.
County. NA.
Distribution. Kenya, Tanzania.

***Theridion lacticolor* Berland, 1920**

T. l. Berland, 1920b: 159; Knoflach and van Harten 2000: 215.

Record. Shimoni.
County. KW.
Distribution. Kenya, Yemen, Madagascar.

******Theridion mauense*** **di Caporiacco, 1949 (♀)**

Theridium m. di Caporiacco, 1949: 386.

Record. Mau Range.
County. NA.
Distribution. Known only from the type locality.

******Theridion meneghettii*** **di Caporiacco, 1949**

Theridium m. di Caporiacco, 1949: 390.

Record. Mau Range.
County. NA.
Distribution. Known only from the type locality and by juvenile specimen.

******Theridion nasinotum*** **di Caporiacco, 1949 (♂)**

Ttheridium n. di Caporiacco, 1949: 395.

Record. Mau Range.
County. NA.
Distribution. Known only from the type locality.
Note. Judging from the modified carapace, it does not belong to *Theridion* or related genera.

******Theridion nigroplagiatum*** **di Caporiacco, 1949 (♀)**

Theridium n. di Caporiacco, 1949: 389.

Record. Mau Range.
County. NA.
Distribution. Known only from the type locality.

******Theridion petrunkevitchi*** **Berland, 1920 (♀)**

T. p. Berland, 1920b: 155.

Record. Kikuyu: Kijabe.

County. NA.
Distribution. Known only from the type locality.

^*Theridion pluviale* Tullgren, 1910 (♀)

Theridium p.: di Caporiacco 1949: 379.

Record. Nairobi.
County. NB.
Distribution. Kenya, Tanzania.

***Theridion sabinjonis* Strand, 1913**

Theridium s.: di Caporiacco, 1949: 385.

Record. Mau.
County. NA.
Distribution. Central, East Africa.

****Theridion teutanoides* di Caporiacco, 1949 (subadult ♂)**

Theridium t. di Caporiacco, 1949: 385.

Record. Mau Range.
County. NA.
Distribution. Known only from the type locality.

***Theridion trifile* Simon, 1907 (♀)**

Theridium trifle: di Caporiacco 1949: 379.

Records. Mau, Nairobi.
Counties. NA, NB.
Distribution. West, East Africa.

****Theridion trizonatum* di Caporiacco, 1949**

Theridium t. di Caporiacco, 1949: 382.

Record. Nairobi.
County. NB.
Distribution. Known only from the type locality and by a juvenile specimen.

******Theridion zebra*** **di Caporiacco, 1949**

Theridium z. di Caporiacco, 1949: 381.

Record. Nairobi.
County. NB.
Distribution. Known only from the type locality and by a juvenile specimen.

******Theridula albonigra albonigra*** **di Caporiacco, 1949 (♀)**

T. a. a. di Caporiacco, 1949: 396.

Record. Mau Forest.
County. NA.
Distribution. Known only from the type locality.

******Theridula albonigra vittata*** **di Caporiacco, 1949 (♀)**

T. a. v. di Caporiacco, 1949: 397.

Record. Mau Forest.
County. NA.
Distribution. Known only from the type locality.

******Theridula pulchra*** **Berland, 1920 (♂)**

T. p. Berland, 1920b: 150.

Record. Kijabe.
County. NA.
Distribution. Known only from the type locality.

Theridula opulenta **(Walckenaer, 1837)**

T. o.: di Caporiacco 1939: 397.

Record. Nairobi.
County. NB.
Distribution. North America. Introduced to southern Europe.

^*Thwaitesia argenteoguttata* **(Tullgren, 1910)**

T. a.: Berland 1920b: 149; di Caporiacco 1949: 398.

Records. Mau, Nairobi, Mount Kenya: Amboni.
Counties. KY, NA, NB.
Distribution. Kenya, Tanzania.

Thymoites chopardi* (Berland, 1920) (♂)**

Sphyrotinus c. Berland, 1920b: 164.

Record. Kikuyu: Kijabe.
County. NA.
Distribution. Known only from the type locality.

Tidarren cuneolatum **(Tullgren, 1910)**

Theridion c.: Berland 1920b: 155; *Theridium c.*: di Caporiacco 1949: 379.

Records. Mau, Elmenteita, Fort Hall.
Counties. MU, NA, NK.
Distribution. Cape Verde Is., Canary Is., Africa, Yemen.

Theridiosomatidae Simon, 1881

Theridiosoma kikuyu* Brignoli, 1979 (♀)**

T. k. Brignoli, 1979a: 487.

Record. Lake Naivasha.
County. NK.
Distribution. Known only from the type locality.

Thomisidae Sundevall, 1833

Diaea albicincta **Pavesi, 1883**

D. a.: di Caporiacco 1949: 459.

Records. Mau, Nairobi.
Counties. NA, NB.
Distribution. Congo, Ethiopia, East Africa.

Diaea taibeli* di Caporiacco, 1949 (♀)**

D. t. di Caporiacco, 1949: 459.

Record. Nairobi.
County. NB.
Distribution. Known only from the type locality.

Firmicus campestratus Simon, 1907

F. c.: di Caporiacco 1949: 459.

Record. Nairobi.
County. NB.
Distribution. West Africa, DR Congo, Kenya.
Note. Identification based on juvenile specimens.

^*Heriaeus latifrons* de Lessert, 1919 (♀)

H. l.: di Caporiacco 1949: 461.

Record. Elmenteita.
County. NK.
Distribution. Kenya, Tanzania.

**Misumena pallescens* di Caporiacco, 1949 (subadult ♀)

M. p. di Caporiacco 1949: 457.

Record. Nairobi.
County. NB.
Distribution. Known only from the type locality.

Monaeses gibbus Dippenaar-Schoeman, 1984

M. g.: Warui et al. 2004: 20.

Record. Mpala Ranch.
County. LK.
Distribution. Kenya, South Africa.

Monaeses pustulosus Pavesi, 1895

M. p.: di Caporiacco 1940: 776; di Caporiacco 1949: 455; Dippenaar-Schoeman 1984: 112; Warui et al. 2004: 20.

Records. Elmenteita, Mpala Ranch.
Counties. LK, NK.

Distribution. Ethiopia to South Africa.

***Mystaria budongo* Lewis & Dippenaar-Schoeman, 2014 (♂)**

M. b. Lewis and Dippenaar-Schoeman 2014: 114.

Record. Kakamega Forest.
County. KK.
Distribution. DR Congo, Kenya, Rwanda, Uganda.

^*Mystaria soleil* Lewis & Dippenaar-Schoeman, 2014

M. s. Lewis and Dippenaar-Schoeman 2014: 130.

Record. Kakamega Forest.
County. KK.
Distribution. Uganda, Kenya.

***Mystaria stakesbyi* Lewis & Dippenaar-Schoeman, 2014**

M. s. Lewis & Dippenaar-Schoeman, 2014: 131.

Record. Kakamega Forest.
County. KK.
Distribution. DR Congo, Liberia, Gabon, Ghana, Kenya, Rwanda, Tanzania, Uganda.

***Mystaria variabilis variabilis* (de Lessert, 1919)**

Paramystaria v. v.: di Caporiacco 1949: 454; *M. v. v.*: Lewis and Dippenaar-Schoeman 2014: 133.

Records. Lake Baringo, Lodwar, Nairobi.
Counties. BR, NB, TU.
Distribution. Mozambique, South Africa, Tanzania, DR Congo, Ethiopia, Kenya, Malawi, Rwanda, Uganda.

****Mystaria variabilis delesserti* (di Caporiacco, 1949) (♀)**

Paramystaria v. d. di Caporiacco, 1949: 454; *M. v. d.*: Lewis and Dippenaar-Schoeman 2014: 135.

Record. Nairobi.
County. NB.

Distribution. Known only from the type locality.

Note. It is very likely that this subspecies name is a synonym of *M. v. variabilis*, because the specimens assigned to these two subspecies have been collected in the same locality.

^*Oxytate concolor* (di Caporiacco, 1947) (♀)

Dieta c.: di Caporiacco 1949: 454.

Records. Mau, Nairobi.

Counties. NA, NB.

Distribution. Ethiopia, Kenya.

***Runcinia aethiops* (Simon, 1901)**

R. a.: di Caporiacco 1949: 458; Dippenaar-Schoeman 1983: 46.

Records. Karura Forest, Nairobi.

County. NB.

Distribution. Africa

***Runcinia carae* Dippenaar-Schoeman, 1983**

R. a. Dippenaar-Schoeman, 1983: 41.

Record. Lake Nakuru.

County. NK.

Distribution. Botswana, Kenya.

***Runcinia depressa* Simon, 1906**

R. d.: di Caporiacco 1949: 458; Dippenaar-Schoeman 1983: 44.

Records. Elmenteita, Mau, Nairobi.

Counties. NA, NB, NK.

Distribution. Africa.

***Runcinia erythrina* Jézéquel, 1964**

R. e.: Dippenaar-Schoeman 1983: 43

Record. Lake Nakuru.

County. NK.

Distribution. East, West, Southern Africa (Ivory Coast, Zimbabwe, Kenya, South Africa).

***Runcinia flavida* (Simon, 1881)**

R. proxima: di Caporiacco 1949: 458; *R. f.*: Dippenaar-Schoeman 1983: 39.

Records. Mackinnon Road, Nairobi, Lake Nakuru.
Counties. KW, NB, NK.
Distribution. Spain, Africa.

***Runcinia tropica* Simon, 1907**

R. affinis tropica: di Caporiacco 1949: 458.

Records. Nairobi, Mau.
Counties. NA, NB.
Distribution. Africa.

******Stiphropus lugubris* **Gerstaecker, 1873 (♂)**

S. l. Gerstaecker, 1873: 479; *S. l.*: Benjamin 2011: 20.

Record. Jipe Lake (type locality), Kakamega Forest.
County. KK, TT.
Distribution. Kenya.
Note. Benjamin (2011) mentioned that the species was collected during the expedition to Kilimanjaro (Tanzania) although its type locality is clearly indicated as 'See Jipe' (=Jipe Lake). The lake is located on the border between Kenya and Tanzania.

***Sylligma theresa* Lewis & Dippenaar-Schoeman, 2011**

S. t. Lewis & Dippenaar-Schoeman, 2011: 129.

Record. Homa Bay.
County. HB.
Distribution. Nigeria, Rwanda, Kenya.

^*Synema concolor* di Caporiacco, 1947 (♀)

S. c.: di Caporiacco 1949: 460.

Record. Nairobi.

County. NB.
Distribution. Kenya, Tanzania.

Synema diana (Audouin, 1826)

S. d.: di Caporiacco 1949: 460.

Records. Elmenteita, Mau, Nairobi.
Counties. NA, NB, NK.
Distribution. Tunisia to Saudi Arabia, Kenya.

Thomisops pupa Karsch, 1879

T. p.: di Caporiacco 1939: 361; Dippenaar-Schoeman 1989: 327.

Records. Maktau, Kilifi, Diani Beach.
Counties. KL, KW, TT.
Distribution. Africa.

Thomisus blandus Karsch, 1880

T. malevolus ocellitibiis di Caporiacco, 1949: 457; *T. a.*: Dippenaar-Schoeman, 1983: 13.

Record. Mau Range.
County. NA.
Distribution. Africa, Yemen.

Thomisus kalaharinus Lawrence, 1936

T. k.: Dippenaar-Schoeman 1983: 27.

Record. Sankuri.
County. TR.
Distribution. Africa, Yemen.

Thomisus scrupeus (Simon, 1886)

T. caffer: di Caporiacco 1949: 457; *T. s.*: Dippenaar-Schoeman1983: 17.

Record. Nairobi.
County. NB.
Distribution. Africa.

Note. Species was identified by di Caporiacco (1949), based on a juvenile female. Dippenaar-Schoeman (1983) seems to refer to the di Caporiacco identification.

***Thomisus citrinellus* Simon, 1875**

T. spinifer spinifer: di Caporiacco 1949: 456; *T. spinifer simoni*: di Caporiacco 1949: 456; *T. spinifer maculitibiis*: di Caporiacco 1949: 456; *T. spinifer obscurus*: di Caporiacco 1949: 456; *T. c.*: Dippenaar-Schoeman 1983: 22.

Records. Elmenteita, Mackinnon Road, Nairobi, Kabete.
Counties. KB, KW, NB, NK.
Distribution. Mediterranean, Africa, Seychelles, Yemen (mainland, Socotra), Iraq.

***Thomisus stenningi* Pocock, 1900**

T. weberi: di Caporiacco 1949: 456.

Record. Nairobi.
County. NB.
Distribution. Africa, Seychelles, Yemen.

***Tmarus malleti* de Lessert, 1919**

T. m.: di Caporiacco 1949: 454.

Record. No precise records.
County. K.
Distribution. Central, East Africa.

***Tmarus planetarius* Simon, 1903**

T. p.: Dippenaar-Schoeman 1985: 125.

Record. Kakamega Forest.
County. KK.
Distribution. Africa.

****Tmarus toschii* di Caporiacco, 1949 (♂)**

T. t. di Caporiacco, 1949: 454.

Record. Nairobi.
County. NB.
Distribution. Known only from the type locality.

Xysticus jugalis larvatus* di Caporiacco, 1949

X. j. l. di Caporiacco, 1949: 458.

Record. Mau Range.
County. NA.
Distribution. Known only from the type locality.

^*Xysticus subjugalis nigerrimus* di Caporiacco, 1941 (♂)

X. j. n.: di Caporiacco 1949: 459.

Record. Mau.
County. NA.
Distribution. Ethiopia, Kenya.

Titanoecidae Lehtinen, 1967

***Pandava laminata* (Thorell, 1878)**

P. l.: Almeida-Silva et al. 2010: 34.

Records. Gedi Coastal Forest, Kilifi, Ocean Spot Hotel.
County. KL.
Distribution. Eastern Africa to China and French Polynesia, introduced to Europe.

Trachelidae Simon, 1897

****Orthobula milloti* di Caporiacco, 1949**

O. m. di Caporiacco, 1949: 441.

Record. Nairobi.
County. NB.
Distribution. Known only from the type locality.

****Patelloceto media* Lyle & Haddad, 2010**

P. m. Lyle & Haddad, 2010: 377.

Record. Kakamega Forest.
County. KK.
Distribution. From easternmost DR Congo to eastern Tanzania.

^*Trachelas chubbi* de Lessert, 1921

T. c.: di Caporiacco 1949: 443.

Record. Mau.
County. NA.
Distribution. Kenya, Tanzania.

**Trachelas sylvae* di Caporiacco, 1949 (♂)

T. s. di Caporiacco, 1949: 443.

Record. Mau Range.
County. NA.
Distribution. Known only from the type locality.

Trochanteriidae Karsch, 1879

Platyoides grandidieri Simon, 1903

P. g.: Platnick 1985: 12.

Record. Malindi.
County. KL.
Distribution. Kenya, Madagascar, Seychelles, Réunion.

Uloboridae Thorell, 1869

Uloborus plumipes Lucas, 1846

U. p.: di Caporiacco 1949: 325.

Records. Mau, Nairobi.
Counties. NA, NB.
Distribution. Europe, Africa, Yemen, Pakistan, Philippines. Introduced to Argentina, Japan.

Zodariidae Thorell, 1881

The family is relatively well studied in Kenya due to several revisional works (Jocqué 1987, 1990, 1991, 2009; Jocqué and Billen 1987; Henrard and Jocqué 2015).

***Akyttara mahnerti** **Jocqué, 1987 (♀)**

A. m. Jocqué, 1987: 151.

Record. Malindi.
County. KL.
Distribution. Known only from the type locality.

***Akyttara ritchiei** **Jocqué, 1987 (♂)**

A. r. Jocqué, 1987: 151.

Record. Kora National Reserve.
County. TR.
Distribution. Known only from the type locality.

***Cydrela albopilosa** **Simon & Fage, 1922 (♂)**

C. a. Simon and Fage 1922: 538.

Record. Shimoni.
County. KW.
Distribution. Known only from the type locality.

***Diores brevis** **Jocqué, 1990 (♂)**

D. b. Jocqué, 1990: 35.

Record. Oloolua Forest.
County. NB.
Distribution. Known only from the type locality.

***Diores delesserti** **di Caporiacco, 1949 (♀)**

D. d. di Caporiacco, 1949: 342; Jocqué 1990: 77.

Record. Nairobi.
County. NB.
Distribution. Known only from the type locality.

^**Diores initialis** **Jocqué, 1990**

D. i. Jocqué, 1990: 37.

Records. Kora National Reserve, Mount Suswa.
Counties. KJ, TR.
Distribution. Kenya, Tanzania.

**Diores kenyae* Berland, 1920 (♀)

D. k. Berland, 1920a: 348; 1920b: 118; Jocqué 1990: 78.

Record. Amboni.
County. NI.
Distribution. Known only from the type locality.

^*Diores murphyorum* Jocqué, 1990

D. m. Jocqué, 1990: 39.

Record. Kilifi.
County. KL.
Distribution. Kenya, Tanzania.

**Diores naivashae* Berland, 1920 (♀)

D. n. Berland, 1920b: 120; Jocqué 1990: 74.

Records. Naivasha (type locality), Kikuyu.
Counties. KB, NK.
Distribution. Kenya.

Diores strandi di Caporiacco, 1949

D. s. di Caporiacco, 1949: 343; Jocqué 1990: 48; Warui et al. 2004: 20.

Records. Nairobi, Kibwezi, Mount Suswa, National Museum, Mpala Ranch, Langata.
Counties. LK, MK, NB, NR.
Distribution. Kenya, Rwanda, DR Congo.

**Diores tavetae* Berland, 1920 (♀)

D. t. Berland, 1920b: 121; Jocqué 1990: 76.

Record. Taveta.
County. TT.
Distribution. Known only from the type locality.

******Hermippus schoutedeni*** de Lessert, 1938 (♂)**

H. s. de Lessert, 1938: 433; Jocqué 1986: 18.

Record. Ziwani.
County. NB.
Distribution. Known only from the type locality.

^*Mallinella kibonotensis* (Bosmans & van Hove, 1986)

Langbiana k. Bosmans & van Hove, 1986: 26.

Record. Kajiado.
County. KJ.
Distribution. Kenya, Tanzania.

***Mallinella nyikae* (Pocock, 1898) (♂)**

Storena n.: di Caporiacco, 1949: 342.

Record. Mau.
County. NA.
Distribution. Kenya, Malawi.

******Mastidiores kora*** Jocqué & Billen, 1987**

M. k. Jocqué and Billen 1987: 168; Jocqué 1987: 158.

Record. Kora National Reserve.
County. TR.
Distribution. Known only from the type locality.

******Suffrica chawia*** Henrard & Jocqué, 2015 (♂)**

S. c. Henrard & Jocqué, 2015: 5.

Record. Taita Hills.
County. TT.
Distribution. Known only from the type locality.

***Systenoplacis biunguis* (Strand, 1913) (subadult ♀)**

Cydrela b. (?): Berland 1920b: 117.

Record. Victoria-Nyanza.
County. HB.
Distribution. Central, East Africa.

***Systenoplacis falconeri* (di Caporiacco, 1949) (♂)**

Cydrela f. di Caporiacco, 1949: 344; *Capheris f.*: Jocqué 1991: 117; *S. f.*: Jocqué 2009: 88.

Record. Mackinnon Road.
County. KW.
Distribution. Known only from the type locality.

***Systenoplacis maculatus* (Marx, 1893)**

S. m.: Jocqué 2009: 91.

Records. Kajiado, Taita Hills.
Counties. KJ, TT.
Distribution. From Eastern DR Congo to Eastern Tanzania and Kenya.

***Systenoplacis michielsi* Jocqué, 2009**

S. m. Jocqué, 2009: 96.

Record. Mount Kisigau.
County. TT.
Distribution. Known only from the type locality.

***Systenoplacis multipunctatus* (Berland, 1920)**

Cydrela multipunctata Berland, 1920a: 348; Berland 1920b: 115; *S. m.*: Jocqué 2009: 100.

Records. Mount Kenya (type locality), Mount Meru, Wambugi (Wamugi?), Kirimeri Forest (Kirimiri), Ngaia Forest.
Counties. EB, KY, ME, TN
Distribution. Kenya.

^*Systenoplacis waruii* Jocqué, 2009

S. w. Jocqué, 2009: 112.

Records. Taita, Kibwezi.
Counties. MK, TT.
Distribution. Kenya, Tanzania.

Zoropsidae Bertkau, 1882

^*Pseudoctenus meneghettii* di Caporiacco, 1949

P. m. di Caporiacco 1949: 448; Jocqué 2009: 709.

Records. Mau Range, Mount Kenya.
Counties. NA, NI.
Distribution. Kenya, Burundi.

Conclusion

The results indicate that Kenya has a diverse spider species and many endemic spiders. However, intensive collection in Kenya has taken place in only a few counties, with nine counties having no collections. It is evident that the number of species in this checklist does not reflect the actual number of spiders in the country, with many areas requiring further exploration. Our data do not extend beyond 2018 and more species have been discovered since our compilation of this list. The majority of the collections were also from only a few collectors, showing that there is a need for capacity building within arachnological studies in the country. People should be presented with the opportunity to learn about the importance of spiders which may generate interest in spiders of this area and thus promote their conservation.

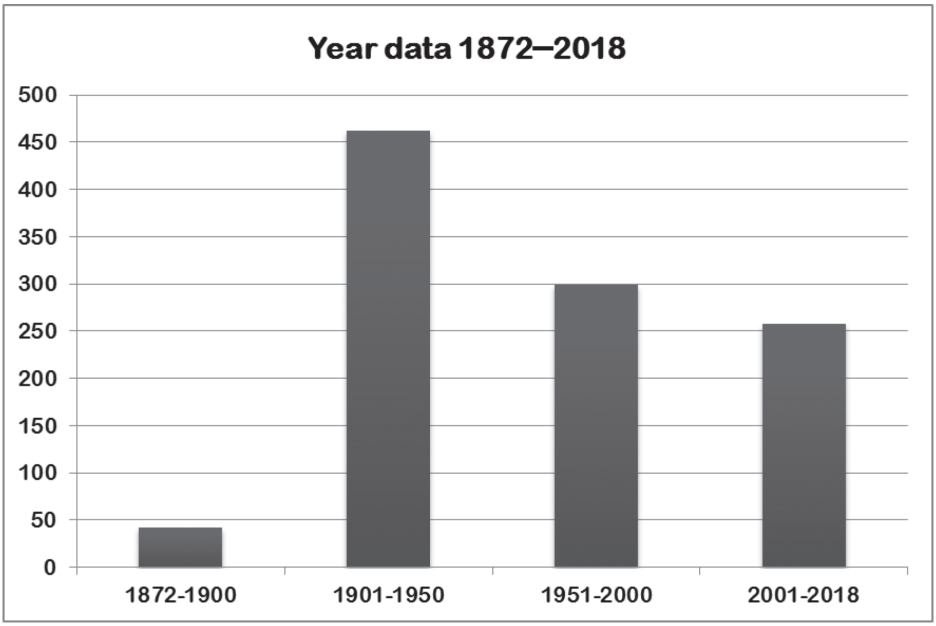

Figure 2. Newly-reported spider species in Kenya over different time periods.

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RESEARCH ARTICLE

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Labiobaetis Novikova & Kluge in Ethiopia (Ephemeroptera, Baetidae), with description of a new species

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Abstract

Material collected between 2017 and 2019 in Ethiopia in the Awash River catchment substantially increased our knowledge of *Labiobaetis* Novikova & Kluge in this country. Four species were previously reported based on ecological investigations of Ethiopian rivers: *L. glaucus* (Agnew, 1961), *L. latus* (Agnew, 1961), *L. vinosus* (Barnard, 1932) and *L. bellus* (Barnard, 1932). We have identified six different species using a combination of morphology and genetic distance (COI, Kimura 2-parameter). Two of them, *L. alahmadii* Gattolliat & Al Dhafer, 2018 and *L. potamoticus* Gattolliat & Al Dhafer, 2018 were previously assumed to be endemic to the Arabian Peninsula. The status of *L. bellus* is discussed and remains unresolved. One species is new to science; it is described and illustrated based on its nymphs. A key to the nymphs of all Ethiopian species is provided. The interspecific K2P distances in Ethiopia are between 17% and 23%, the intraspecific distances are usually between 0% and 1%. The total number of *Labiobaetis* species worldwide is augmented to 145. The Afrotropical species of *Labiobaetis* are discussed in comparison to the species of other realms.

Keywords

COI, genetic distance, integrative taxonomy, morphology

Introduction

The family Baetidae has the highest species diversity among mayflies, comprising ca. 1,100 species in 114 genera (updated from Sartori and Brittain 2015; Jacobus et al. 2019; Cruz et al. 2020), which is approximately one third of all mayfly species worldwide. They have a cosmopolitan distribution except in New Zealand (Gattolliat and Nieto 2009). Investigations of the molecular phylogeny of the Order Ephemeroptera revealed the relatively primitive status of the family (Ogden and Whiting 2005; Ogden et al. 2009; Ogden et al. 2019).

Labiobaetis Novikova & Kluge, 1987, is one of the richest genera of mayflies with 144 previously described species (Barber-James et al. 2013; Kaltenbach et al. 2020 and citations therein). The distribution of *Labiobaetis* is nearly worldwide, except for the Neotropical realm, New Zealand and some remote islands. After a long period of controversy, *Labiobaetis* is nowadays widely accepted as a valid genus (Gattolliat 2001; Fujitani et al. 2003; Fujitani 2008; McCafferty et al. 2010; Kluge and Novikova 2011, 2014, 2016; Kluge 2012; Webb 2013; Kubendran et al. 2014, 2015; Shi and Tong 2014). The history and concept of the genus *Labiobaetis* were recently summarized in detail (Shi and Tong 2014; Kaltenbach and Gattolliat 2018). Kluge and Novikova (2016) established a new tribe Labiobaetini including the genera *Labiobaetis* and *Pseudopannota* Waltz & McCafferty, 1987, based on a unique combination of imaginal and nymphal characters.

Recently, integrative taxonomy was applied to collections from the highly diverse regions of Southeast Asia and New Guinea, where 65 species were described and named (Kaltenbach and Gattolliat 2018, 2019, 2020; Kaltenbach et al. 2020). This contribution will focus on the Afrotropical country of Ethiopia.

Taxonomic studies of *Labiobaetis* have a long history in the Afrotropical realm. First, several species were described from South Africa by Barnard (1932), Crass (1947) and Agnew (1961) under the genus *Baetis* Leach, 1815. Thereafter, Kopelke (1980) named a few species from Central Africa under *Baetis*, based on adults only. Later, Gillies (1993, 1994) published new species from West and East Africa, still assigned to *Baetis*. Lugo-Ortiz and McCafferty (1997) made a revision of *Labiobaetis* in the Afrotropical region including Madagascar and subsequently, Lugo-Ortiz et al. (2000) provided a revision of the widespread species *L. glaucus* (Agnew, 1961). Gattolliat (2001) described six new species in his comprehensive study of the genus *Labiobaetis* in Madagascar. Kluge and Novikova (2016) contributed to the fauna of Central Africa and defined the tribe Labiobaetini. Finally, Gattolliat et al. (2018) studied the species from Saudi Arabia, which is bordering the Palaearctic realm, and described two new species. Until now, *Labiobaetis* encompasses 25 species in the Afrotropical realm, including two species only known from Saudi Arabia (Barber-James et al. 2013; Gattolliat et al. 2018).

The examined material was collected between 2017 and 2019 during ecological studies of the Awash River (Englmaier et al. 2020; Kebede et al. 2020). The collection area encompassed the whole Awash River catchment, including its major affluents (Fig. 1). The Awash River is endorheic; it springs in the Ethiopian Highlands at an

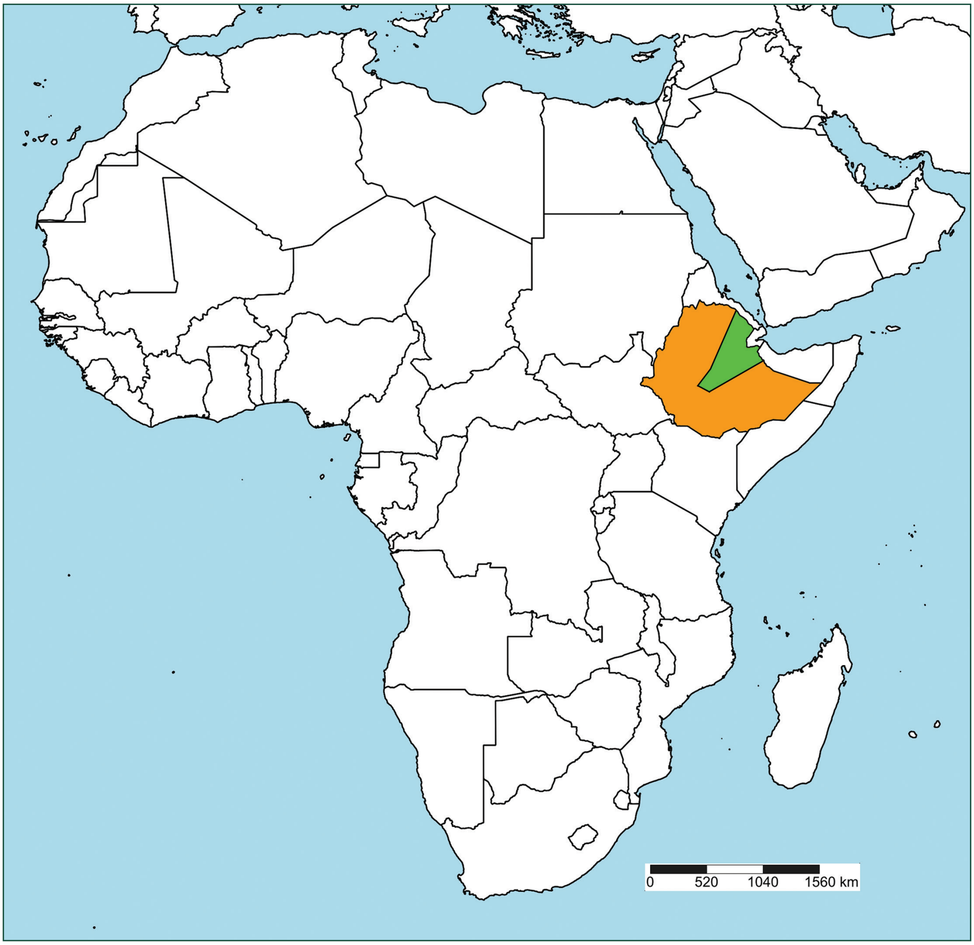

Figure 1. Map of Africa with Ethiopia (orange) including the Awash River catchment (green).

altitude of > 3000 m in the Chilimo Forest and flows into the arid Afar Depression, where it finally drains into the saline Lake Abbe at the Ethiopian-Djibouti border, at an altitude of ca. 250 m (Englmaier et al. 2020 and citations therein). The study area including the physical conditions at the sampling sites are described and illustrated in detail in Englmaier et al. (2020: fig. 1, table 1). Apart from the protected Chilimo Forest, the region is subject to extensive anthropogenic impact (intensive agriculture, overgrazing by livestock), resulting in the loss of natural vegetation (Englmaier et al. 2020 and citations therein). The eco-geographical features of Ethiopia, including altitude, geology, hydrology, rainfall, temperature, soil types and land cover, as well as its freshwater ecoregions, are described in Haile and Moog (2016). Ethiopia shares two ecoregions, mainly the Central Eastern Africa ecoregion, but also to a small extent the North Africa and Sahara Desert ecoregion in the northwestern part of the country (Barber-James and Gattolliat 2012).

Table 1. Sequenced specimens.

Species	Locality	Specimens catalog #	GenBank # (COI)	GenSeq Nomenclature
L. alahmadii	Ethiopia	GBIFCH00763723	MW307223	genseq-4 COI
		GBIFCH00763718	MW307225	genseq-4 COI
		GBIFCH00763720	MW307222	genseq-4 COI
		GBIFCH00763724	MW307224	genseq-4 COI
		GBIFCH00763732	MW307227	genseq-4 COI
		GBIFCH00763719	MW307226	genseq-4 COI
	Saudi Arabia	GBIFCH00517527	MH070307	genseq-2 COI
		GBIFCH00235747	MH070313	genseq-2 COI
		GBIFCH00235757	MH070314	genseq-2 COI
		GBIFCH00517526	MH070322	genseq-2 COI
		GBIFCH00465155	MH070291	genseq-2 COI
L. excavatus sp. nov.	Ethiopia	GBIFCH00763725	MW307229	genseq-2 COI
		GBIFCH00674636	MW307228	genseq-2 COI
L. glaucus	Ethiopia	GBIFCH00763728	MW307230	genseq-4 COI
	Saudi Arabia	GBIFCH00465151	MH070288	genseq-4 COI
		GBIFCH00235741	MH070311	genseq-4 COI
		GBIFCH00235750	MH105068	genseq-4 COI
		GBIFCH00235731	MH070317	genseq-4 COI
		GBIFCH00517523	MH070320	genseq-4 COI
	South Africa	GBIFCH00517537	MH070310	genseq-4 COI
		GBIFCH00517539	MH070321	genseq-4 COI
		GBIFCH00517538	MH070319	genseq-4 COI
	Mayotte	GBIFCH00517531	MH105069	genseq-4 COI
		GBIFCH00521580	MH070315	genseq-4 COI
		GBIFCH00517530	MH070318	genseq-4 COI
L. latus	Ethiopia	GBIFCH00763729	MW307231	genseq-4 COI
L. potamoticus	Ethiopia	GBIFCH00763731	MW307235	genseq-4 COI
		GBIFCH00763721	MW307233	genseq-4 COI
		GBIFCH00763727	MW307234	genseq-4 COI
		GBIFCH00674637	MW307232	genseq-4 COI
	Saudi Arabia	GBIFCH00517520	MH070306	genseq-2 COI
		GBIFCH00517521	MH070308	genseq-2 COI
		GBIFCH00235735	MH070312	genseq-2 COI
		GBIFCH00235732	MH070316	genseq-2 COI
		GBIFCH00465152	MH070289	genseq-2 COI
		GBIFCH00465154	MH070290	genseq-2 COI

So far, the diversity of *Labiobaetis* in Ethiopia has only become known through an ecological study of the benthic fauna of mountain streams and rivers (Harrison and Hynes 1988). Four species were reported in this study: *L. glaucus* (Agnew, 1961), *L. latus* (Agnew, 1961), *L. vinosus* (Barnard, 1932) and *L. bellus* (Barnard, 1932). The identity and status of *L. bellus* is unclear and will be discussed below. Here, we report three additional species from the Awash River catchment, one of which is described and illustrated as a new species, based on nymphs. The total number of *Labiobaetis* species worldwide is augmented to 145.

Materials and methods

All specimens were collected between 2017 and 2019 by Wolfram Graf (University of Natural Resources and Life Sciences, Austria) and Yonas Terefe (Ambo University, Ethiopia) and preserved in 70–96% ethanol.

Table 2. GPS coordinates of locations of examined specimens.

Species	Locality	GPS coordinates
L. alahmadii	Ethiopia: Mille River	11°24'50"N, 40°45'38"E
	Ethiopia: Korkada	08°30'03"N, 39°33'07"E
	Ethiopia: Lafessa	08°23'16"N, 38°54'31"E
	Ethiopia: Worer	09°20'07"N, 40°10'20"E
L. excavatus sp. nov.	Ethiopia: Awash	09°04'01"N, 38°08'09"E
L. glaucus	Ethiopia: Borkana River	10°39'59"N, 39°55'53"E
	Ethiopia: Lafessa	08°23'16"N, 38°54'31"E
	Ethiopia: Dubti	11°41'50"N, 41°07'23"E
	Ethiopia: Worer	09°20'07"N, 40°10'20"E
	Ethiopia: Sulula	08°39'57"N, 38°37'59"E
L. latus	Ethipoia: Lafessa	08°23'16"N, 38°54'31"E
L. potamoticus	Ethiopia: Dubti	11°41'50"N, 41°07'23"E
	Ethiopia: Worer	09°20'07"N, 40°10'20"E
	Ethiopia: Wonji	08°28'24"N, 39°12'44"E
	Ethiopia: Lafessa	08°23'16"N, 38°54'31"E
	Ethiopia: Awash Kunture	08°42'22"N, 38°36'19"E
	Ethiopia: Yimre	09°04'59"N, 40°10'03"E
L. vinosus	Ethiopia: Lafessa	08°23'16"N, 38°54'31"E
	Ethiopia: Korkada	08°30'03"N, 39°33'07"E

The dissection of nymphs was performed in Cellosolve (2-Ethoxyethanol) with subsequent mounting on slides with Euparal liquid, using an Olympus SZX7 stereo-microscope.

The DNA of part of the specimens was extracted using non-destructive methods allowing subsequent morphological analysis (see Vuataz et al. 2011 for details). We amplified a 658 bp fragment of the mitochondrial gene cytochrome oxidase subunit 1 (COI) using the primers LCO 1490 and HCO 2198 (Folmer et al. 1994; see Kaltenbach and Gattolliat 2020 for details). Sequencing was done with Sanger's method (Sanger et al. 1977). The genetic variability between specimens was estimated using Kimura-2-parameter distances (K2P, Kimura 1980), calculated with MEGA 7 (Kumar et al. 2016, http://www.megasoftware.net).

The GenBank accession numbers are given in Table 1, nomenclature of gene sequences follows Chakrabarty et al. (2013).

Drawings were made using an Olympus BX43 microscope. To facilitate the determination of the new species and the comparison of important structures with other species, we partly used a combination of dorsal and ventral aspects in one drawing (see Kaltenbach et al. 2020: fig. 1).

Photographs of nymphs were taken using a Canon EOS 6D camera and the Visionary Digital Passport imaging system (http://www.duninc.com) and processed with Adobe Photoshop Lightroom (http://www.adobe.com) and Helicon Focus version 5.3 (http://www.heliconsoft.com). Photographs were subsequently enhanced with Adobe Photoshop Elements 13.

The distribution maps were generated with SimpleMappr (https://simplemappr.net, Shorthouse 2010). The GPS coordinates of the sample locations are given in Table 2.

The dichotomous key was elaborated with the support of DKey version 1.3.0 (http://drawwing.org/dkey, Tofilski 2018).

The terminology follows Hubbard (1995) and Kluge (2004). The description follows the form of other recent descriptions of *Labiobaetis*, as for example in Kaltenbach et al. 2020.

Results

Abbreviations

MZL Musée de Zoologie Lausanne (Switzerland).

List of *Labiobaetis* species from Ethiopia

1. *L. alahmadii* Gattolliat & Al Dhafer, 2018
2. *L. excavatus* sp. nov.
3. *L. glaucus* (Agnew, 1961)
4. *L. latus* (Agnew, 1961)
5. *L. potamoticus* Gattolliat & Al Dhafer, 2018
6. *L. vinosus* (Barnard, 1932)
7. *L. bellus* (Barnard, 1932)

(*L. bellus*: unclear identity and status, no further treatment in this study, see discussion)

1. *Labiobaetis alahmadii* Gattolliat & Al Dhafer, 2018

Gattolliat et al. 2018: figs 20–33.

Differential diagnosis. ***Nymph.*** Following combination of characters: A) colouration: abdomen dorsally brown, with light pattern as Gattolliat et al. 2018: figs 32, 33; B) scape without distolateral process; C) labial palp segment II with thumb-like protuberance; segment III slightly pentagonal; D) maxillary palp segment II with excavation at inner distolateral margin; E) fore femur rather broad, length ca. 3× maximum width; dorsal margin with ca. 18 curved, spine-like setae and many fine, simple setae, and basally some additional spine-like setae near margin; femoral patch reduced; F) fore tibia dorsally with a row of short, spatulate setae (Gattolliat et al. 2018: fig. 26); G) hind protoptera well developed; H) seven pairs of gills; I) paraproct with ca. 16 stout, marginal spines.

Examined material. Ethiopia • 6 nymphs; Lower Mille River; 11°24'50"N, 40°45'38"E; 482 m; leg. W. Graf; 5 in alcohol; GenBank MW307224; GBIFCH00763724, GBIFCH00515555; 1 on slide; GenBank MW307223; GBIFCH00763723 • 1 nymph; Korkada; 08°30'03"N, 39°33'07"E; 09.12.2017; 1260 m; leg. W. Graf; Kk2; in alcohol; GenBank MW307225; GBIFCH00763718 • 1 nymph; Korkada; 08°30'03"N, 39°33'07"E; 1260 m; 09.11.2017; leg. W. Graf; Kk1; in alcohol; GenBank MW307226; GBIFCH00763719 • 1 nymph; Worer; 09°20'07"N, 40°10'20"E; 740 m; 29.01.2018; leg W. Graf; Wr1; in alcohol; GenBank MW307222; GBIFCH00763720 • 1 nymph; Lafessa; 08°23'16"N; 38°54'31"E; 1600 m; 05.11.2017; Lf1; leg. W. Graf; in alcohol; GenBank MW307227; GBIFCH00763732; all material in MZL.

Biological aspects. The specimens were collected at altitudes between 480 m and 1600 m. Further characteristics of sampling sites are given in Englmaier et al. 2020: table 1. In Saudi Arabia, the species occurs in medium-size streams with stony substrates, preferably in relatively fast flowing water or even at the base of small waterfalls (Gattolliat et al. 2018).

Distribution. Ethiopia (Fig. 2a), Saudi Arabia (Gattolliat et al. 2018).

2. *Labiobaetis excavatus* sp. nov.

http://zoobank.org/15AB1723-9D5C-4128-A058-719772F436D8
Figures 2a, 3–5

Differential diagnosis. ***Nymph.*** Following combination of characters: A) colouration: abdomen dorsally uniform brown; B) scape with well-developed distolateral process; C) labial palp segment II with broad, thumb-like distomedial protuberance; segment III oblong; D) maxillary palp segment II with strong excavation at inner distolateral margin; E) fore femur rather slender, length 3.6× maximum width; dorsal margin with 18–27 curved, spine-like setae, and a partial row of spine-like setae near margin; femoral patch absent; F) hind protoptera well developed; G) seven pairs of gills; H) paraproct with 15–20 stout marginal spines.

Description. ***Nymph*** (Figs 3–5). Body length 7.3–8.5 mm. Cerci: ca. 2/3 of body length. Paracercus: ca. 2/3 of cerci length. Antenna: approx. twice as long as head length.

Colouration (Fig. 3a, b). Head, thorax and abdomen dorsally brown, fore protoptera brown. Head, thorax and abdomen ventrally ecru, frons brown. Legs ecru, femora and tarsi apically brown. Caudalii brown.

Antenna (Fig. 4g) with scape and pedicel subcylindrical, with well-developed distolateral process at scape.

Labrum (Fig. 5a). Subrectangular, length 0.7× maximum width. Distal margin with medial emargination and small process. Dorsally with medium, fine, simple setae scattered over surface; submarginal arc of setae composed of one plus ca. 17 long, feathered setae. Ventrally with marginal row of setae composed of lateral and anterolateral long, feathered setae and medial long, bifid setae; ventral surface with ca. nine short, spine-like setae near lateral and anterolateral margin.

Right mandible (Fig. 5b, c). Incisor and kinetodontium fused. Incisor with four denticles; kinetodontium with three denticles, inner margin of innermost denticle with row of thin setae. Prostheca robust, apically denticulate. Margin between prostheca and mola slightly convex. Tuft of setae at apex of mola present.

Left mandible (Fig. 5d, e). Incisor and kinetodontium fused. Incisor with four denticles; kinetodontium with three denticles. Prostheca robust, apically with small

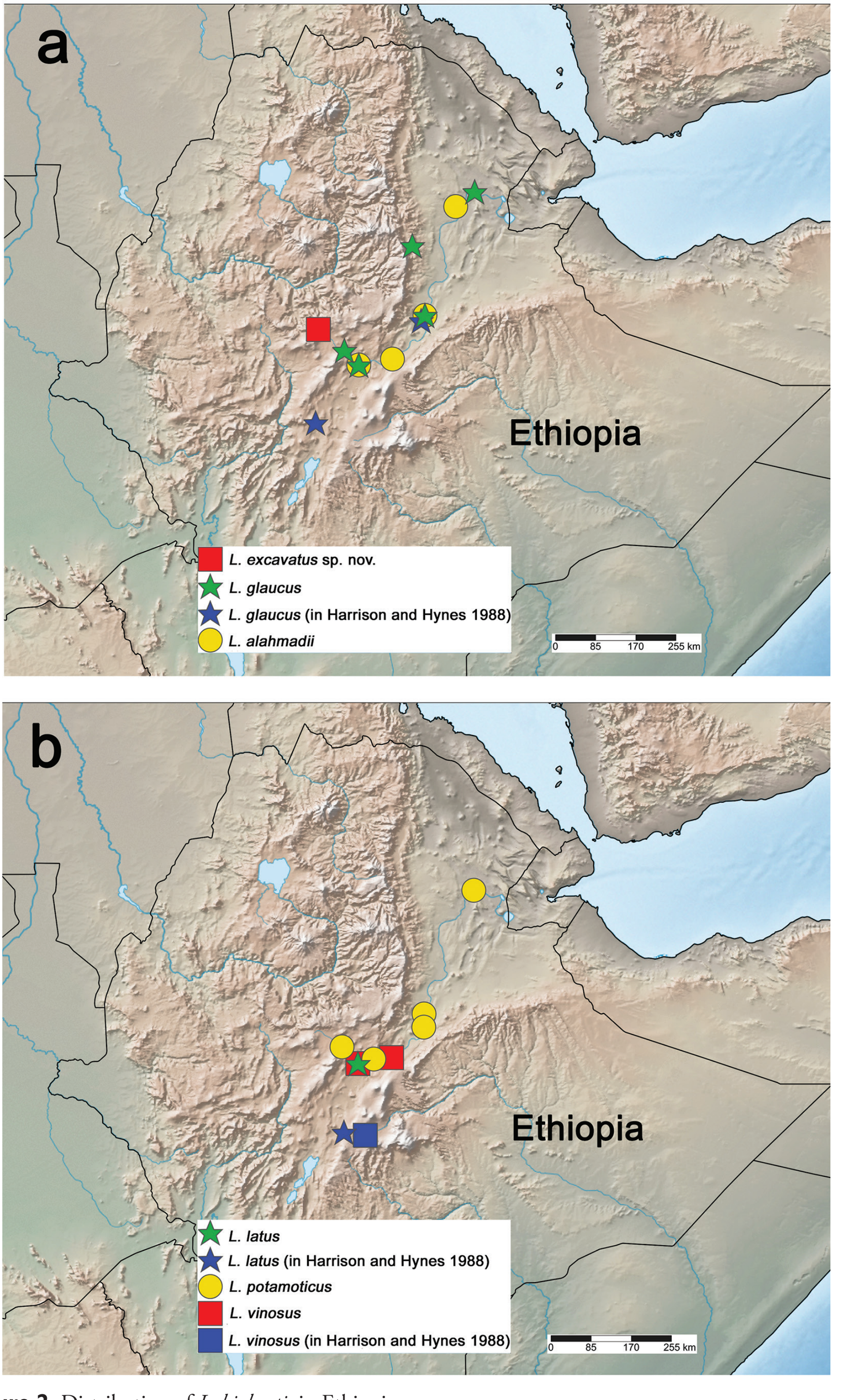

Figure 2. Distribution of *Labiobaetis* in Ethiopia.

Figure 3. *Labiobaetis excavatus* sp. nov., habitus, nymph **a** dorsal view **b** ventral view. Scale bars: 1.0 mm.

denticles and comb-shaped structure. Margin between prostheca and mola slightly convex, with minute denticles towards subtriangular process. Subtriangular process long and slender, above level of area between prostheca and mola. Denticles of mola apically constricted. Tuft of setae at apex of mola absent.

Both mandibles with lateral margins almost straight. Basal half with fine, simple setae scattered over dorsal surface.

Hypopharynx and superlinguae (Fig. 5f). Lingua longer than superlinguae. Lingua longer than broad; medial tuft of stout setae well developed, short; distal half laterally not expanded. Superlinguae distally rounded; lateral margins rounded; fine, long, simple setae along distal margin.

Maxilla (Fig. 5g, h). Galea-lacinia ventrally with two simple, apical setae under canines. Inner dorsal row of setae with three denti-setae, distal denti-seta tooth-like, middle and proximal denti-setae slender, bifid and pectinate. Medially with one pectinate, spine-like seta and six simple setae increasing in length distally. Maxillary palp slightly longer than length of galea-lacinia; 2-segmented; palp segment II 1.4× length of segment I; setae on maxillary palp fine, simple, scattered over surface of segments I and II; apex of last segment rounded, with strong excavation at inner distolateral margin.

Labium (Fig. 5i, j). Glossa basally broad, narrowing toward apex; shorter than paraglossa; inner margin with ca. seven spine-like setae, distalmost seta much longer

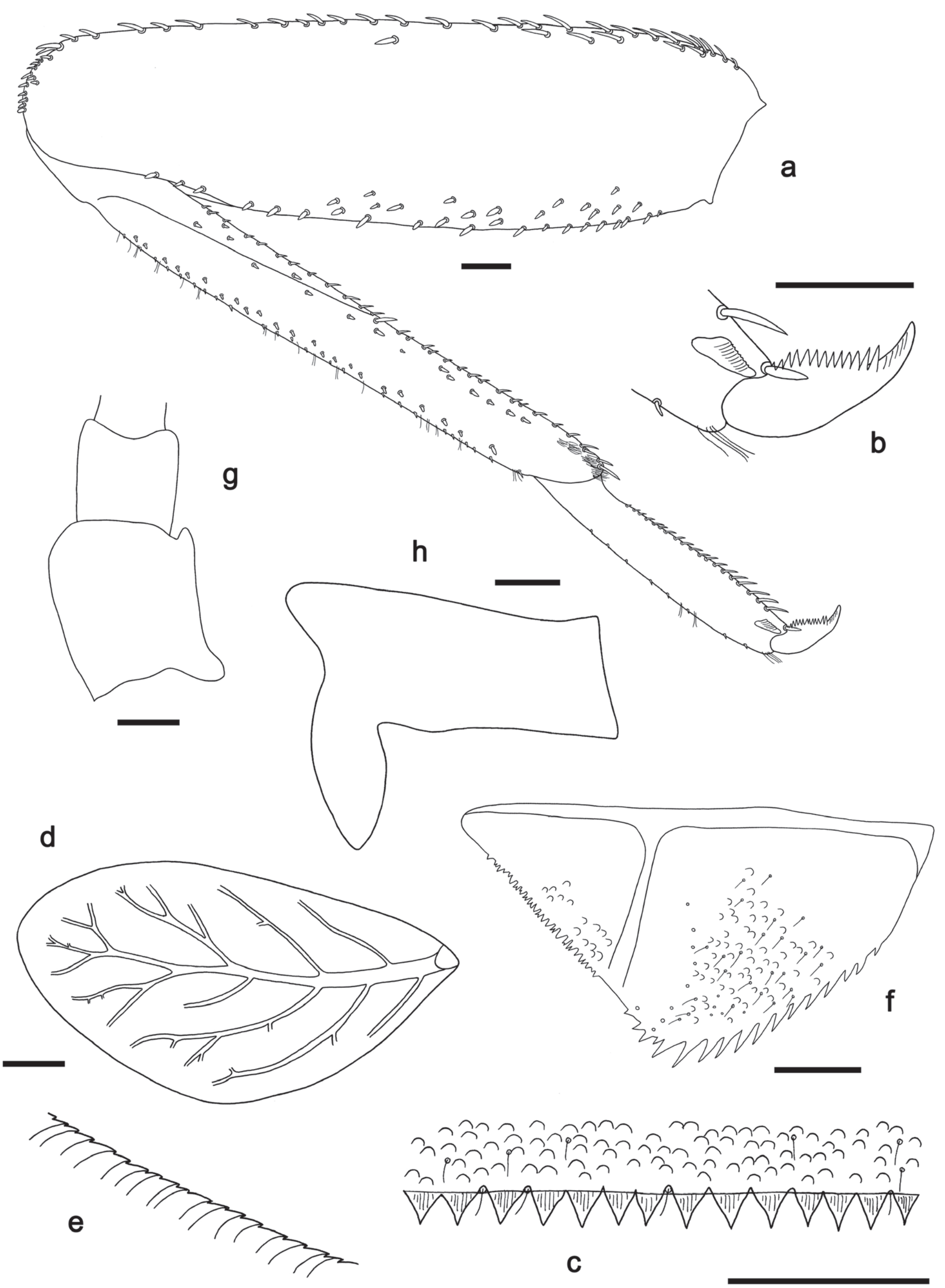

Figure 4. *Labiobaetis excavatus* sp. nov., nymph morphology **a** foreleg **b** fore claw **c** tergum IV **d** gill IV **e** margin of gill IV **f** paraproct **g** antennal scape **h** metanotum. Scale bars: 0.1 mm.

than other setae; apex with one long, one medium and one short, robust seta; outer margin with 5–7 spine-like setae increasing in length distally; ventral surface with fine, simple, scattered setae. Paraglossa sub-rectangular, curved inward; apex rounded;

with three rows of long, robust, distally pectinate setae in apical area and three or four medium, simple setae in anteromedial area; dorsally with row of five long, spine-like, simple setae near inner margin. Labial palp with segment I 0.7× length of segments II and III combined. Segment I ventrally with short, fine, simple setae. Segment II with broad thumb-like distomedial protuberance; distomedial protuberance 0.9× width of base of segment III; ventral surface with short, fine, simple setae; dorsally with two or three long, spine-like setae near outer margin. Segment III oblong; apex slightly pointed; length 1.2× width; ventrally covered with short, spine-like, simple setae and short, fine, simple setae.

Hind protoptera (Fig. 4h) well developed.

Foreleg (Fig. 4a, b). Ratio of foreleg segments 1.1:1.0:0.4:0.1. *Femur*. Length 3.6× maximum width. Dorsal margin with 18–27 curved, spine-like setae and partial second row near margin in basal area; length of setae 0.14× maximum width of femur. Apex rounded, with pair of spine-like setae and some short, stout setae. Many stout, lanceolate setae scattered along ventral margin; femoral patch absent. *Tibia*. Dorsal margin with row of short, stout setae and fine simple setae, and row of short, stout setae near margin. Ventral margin with row of short, curved, spine-like setae, distally of patellotibial suture one longer, curved, spine-like seta, on apex some longer setae and tuft of fine, simple setae. Anterior surface scattered with stout, lanceolate setae. Patellotibial suture present on basal half area. *Tarsus*. Dorsal margin with row of short, stout setae and fine, simple setae. Ventral margin with row of curved, spine-like setae. Claw with one row of 10–13 denticles; distally pointed; with ca. five stripes; subapical setae absent.

Terga (Fig. 4c). Surface with irregular rows of U-shaped scale bases and scattered fine, simple setae. Posterior margin of tergum IV with triangular spines, ca. as long as wide.

Gills (Fig. 4d, e). Present on segments I–VII. Margin with small denticles intercalating fine simple setae. Tracheae extending from main trunk to inner and outer margins. Gill I ca. 2/3 length of segment II; gill IV as long as length of segments V and half VI combined; gill VII slightly longer than length of segment VIII.

Paraproct (Fig. 4f). Distally not expanded, with 15–20 stout, marginal spines. Surface scattered with U-shaped scale bases, fine, simple setae and micropores. Cercotractor with small, marginal spines, partly split at apex.

Etymology. Referring to the strongly developed excavation at inner, distolateral margin of maxillary palp segment II.

Biological aspects. The specimens were collected at an altitude of 2400 m in relatively cold water (15.9 °C; see Englmaier et al. 2020: table 1). The sampling site lies in a protected area (S1, National Forest Priority Area), unlike all other sampling sites in this study (Englmaier et al. 2020).

Distribution. Ethiopia (Fig. 2a).

Type-material. ***Holotype.*** Ethiopia • nymph; Upper Awash River, Chilimo Forest; 09°04'01"N, 38°08'09"E; 2390 m; 06.11.2017; leg. W. Graf; on slide; GBIFCH00592380; MZL. ***Paratypes.*** Ethiopia • 9 nymphs; same data as holotype; 4 on slides; GenBank MW307229, MW307228; GBIFCH00763725, GBIFCH00674636, GBIFCH00592390, GBIFCH00592423; MZL; 5 in alcohol; GBIFCH00515502, GBIFCH00515552; MZL.

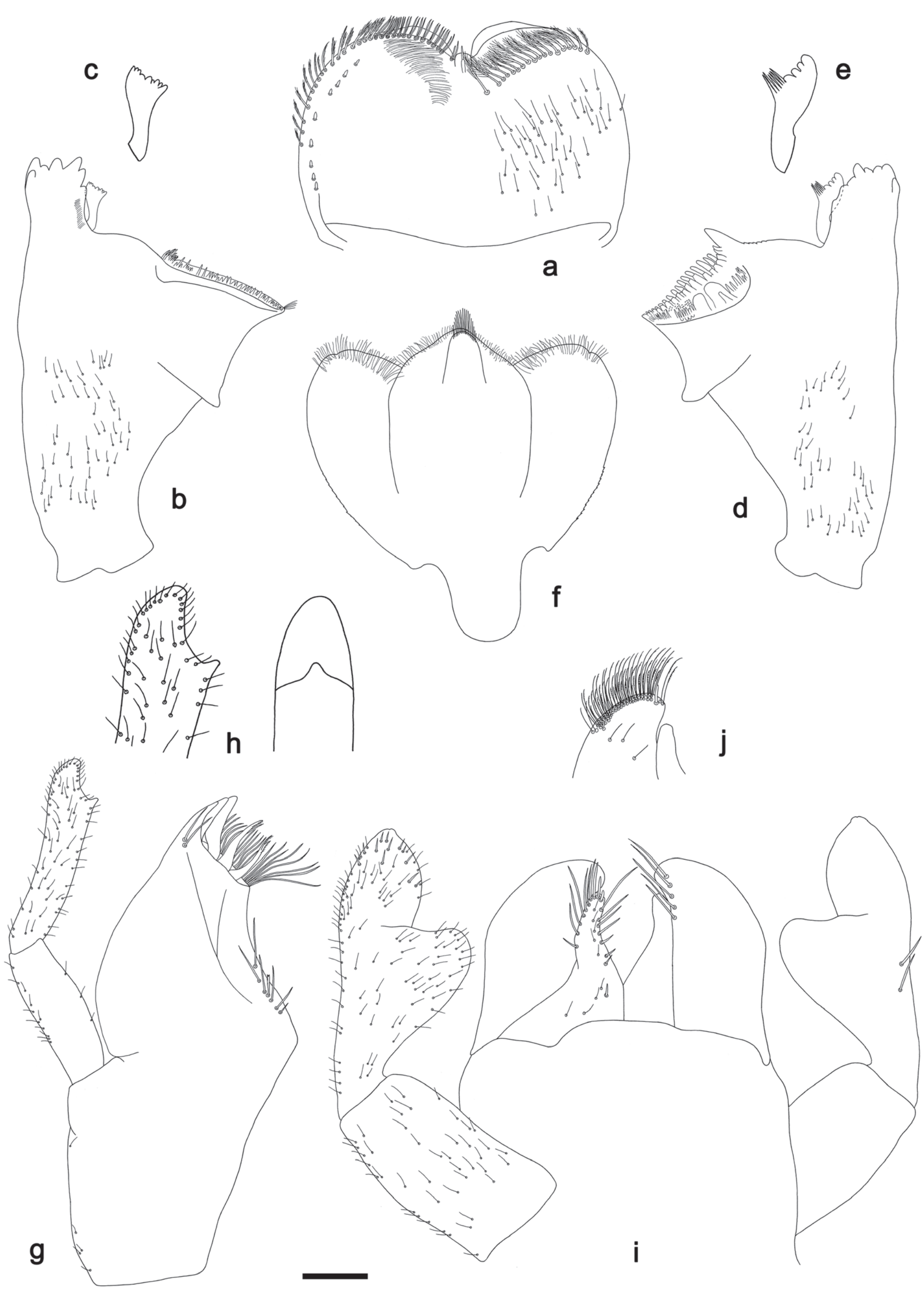

Figure 5. *Labiobaetis excavatus* sp. nov., nymph morphology: **a** labrum **b** right mandible **c** right prostheca **d** left mandible **e** left prostheca **f** hypopharynx and superlinguae **g** maxilla **h** apex of maxillary palp (left: dorsal view, right: inner lateral view) **i** labium **j** apex of paraglossa. Scale bar: 0.1 mm.

3. *Labiobaetis glaucus* (Agnew, 1961)

Agnew 1961 (*Baetis glaucus*)
Lugo-Ortiz and McCafferty 1997: figs 27–38, 39–50 (*Labiobaetis masai*, *L. nadineae*; both formal synonyms, Lugo-Ortiz et al. 2000)
Lugo-Ortiz et al. 2000 (*Pseudocloeon glaucum*)
Gattolliat et al. 2018: figs 34–44, 47

Differential diagnosis. ***Nymph.*** Following combination of characters: A) colouration: abdomen dorsally brown, with pattern as Gattolliat et al. 2018: fig. 47; B) scape without distolateral process; C) labial palp segment II with broad thumb-like protuberance; D) maxillary palp segment II with excavation at inner distolateral margin; E) fore femur rather broad, length ca. 3× maximum width; dorsal margin with 13–18 curved, spine-like setae and basally some additional setae near margin; femoral patch well developed; F) fore tibia dorsally with a row of scarce, tiny, stout setae (Gattolliat et al. 2018: fig. 40); G) hind protoptera well developed; H) seven pairs of gills; I) paraproct with 5–10 stout, marginal spines.

Examined material. Ethiopia • 6 nymphs; Middle Borkana River; 10°38'09"N, 39°55'53"E; 17.03.2019; 1413 m; leg. W. Graf; 1 on slide; GenBank MW307230; GBIFCH00763728; 5 in alcohol; GBIFCH00515556 • 4 nymphs; Lafessa; 08°23'16"N, 38°54'31"E; 1600 m; 08.11.2017; leg. W. Graf; Lf1; in alcohol; GBIFCH00515557 • 1 nymph; Dubti; 11°41'50"N, 41°07'23"E; 2017; 374 m; leg. W. Graf; S14; in alcohol; GBIFCH00515564 • 1 nymph; Sulula; 08°39'57"N, 38°37'59"E; 1916 m; 07.11.2017; leg. W. Graf; Su1; in alcohol; GBIFCH00515563 • 2 nymphs; Worer; 09°20'6.98"; 40°10'19.50"; 740 m; 29.01.2018; leg. W. Graf; Wr1; 1 on slide; GBIFCH00592437; 1 in alcohol; GBIFCH00515565; all material in MZL.

Biological aspects. The specimens were collected at altitudes from 370 m to 1920 m. Further characteristics of sampling sites are given in Englmaier et al. (2020). Harrison and Hynes (1988) reported the species from 750 m to 1900 m in stony runs and torrents. In Saudi Arabia, the species occurs in small, very shallow streams with moderate current and a substrate mixed of sand, cobbles and rock (Gattolliat et al. 2018).

Distribution. Ethiopia (Fig. 2a; Harrison and Hynes 1988), Saudi Arabia, Comoros (Gattolliat et al. 2018), South Africa, Lesotho, Namibia, Kenya (Lugo-Ortiz et al. 2000), Zimbabwe (Harrison and Hynes 1988) and potentially Iran (Tahmasebi et al. 2020).

4. *Labiobaetis latus* (Agnew, 1961)

Agnew 1961 (*Baetis latus*)
Lugo-Ortiz and McCafferty 1997: figs 1–13 (*Labiobaetis aquacidus*; formal synonym, Lugo-Ortiz and de Moor 2000)

Differential diagnosis. ***Nymph.*** Following combination of characters: A) scape with well-developed distolateral process; C) labial palp segment II with broad thumb-like protuberance; D) maxillary palp segment II with excavation at inner distolateral margin; E) fore femur rather broad, length ca. 3× maximum width; dorsal margin with 13–18 curved, spine-like setae; femoral patch rudimentary or absent; F) hind protoptera well developed; G) seven pairs of gills; H) paraproct with 21–29 stout, marginal spines.

Examined material. Ethiopia • 4 nymphs; Lafessa; 08°23'16"N, 38°54'31"E; 1600 m; 08.11.2017; leg. W. Graf; Lf1; 2 on slides; GenBank MW307231; GBIFCH00763729, GBIFCH00592391; 2 in alcohol; GBIFCH00515558, GBIFCH00515553; all material in MZL.

Biological aspects. The specimens were collected at an altitude of 1600 m. Further characteristics of the sampling site are given in Englmaier et al. (2020). Harrison and Hynes (1988) reported the species at 1900 m in marginal vegetation.

Distribution. Ethiopia (Fig. 2b), South Africa, Kenya (Lugo-Ortiz and McCafferty 1997).

5. *Labiobaetis potamoticus* Gattolliat & Al Dhafer, 2018

Gattolliat et al. 2018: figs 1–15, 19

Differential diagnosis. ***Nymph.*** Following combination of characters: A) colouration: abdomen dorsally brown, with pattern as Gattolliat et al. 2018: fig. 19; B) scape without distolateral process; C) labial palp segment II with small, thumb-like protuberance; segment III slightly pentagonal; D) maxillary palp segment II without excavation at inner distolateral margin; E) fore femur rather broad, length ca. 3× maximum width; dorsal margin with ca. 8 curved, spine-like setae; femoral patch reduced; F) hind protoptera well developed; G) seven pairs of gills; H) paraproct with ca. 36 stout, marginal spines.

Examined material. Ethiopia • 2 nymphs; Wonji; 08°28'24"N, 39°12'44"E; 1550 m; 09.11.2017; leg. W. Graf; Wj1; 1 on slide; GenBank MW307235; GBIFCH00763731; 1 in alcohol; GenBank MW307232; GBIFCH00674637 • 9 nymphs; Dubti; 11°41'50"N, 41°07'23"E; 374 m; leg. W. Graf; S14; 8 in alcohol; GBIFCH00515559; 1 in alcohol; GenBank MW307234; GBIFCH00763727 • 9 nymphs; Worer; 09°20'07"N, 40°10'20"E; 740 m; 29.01.2018; leg. W. Graf; Wr1; 8 in alcohol; GBIFCH00515560; 1 in alcohol; GenBank MW307233; GBIFCH00763721 • 2 nymphs; Yimre; 09°04'59"N, 40°10'03"E; 797 m; leg. W. Graf; 1 on slide; GBIFCH00592436; 1 in alcohol; GBIFCH00515566 • 1 nymph; Awash Kunture; 08°42'22"N, 38°36'19"E; 2003 m; 07.11.2017; leg. W. Graf; Ak1; in alcohol; GBIFCH00515567 • 1 nymph; Lafessa; 08°23'16"N, 38°54'31"E; 1600 m; 09.11.2017; leg. W. Graf; Lf1; in alcohol; GBIFCH00515568; all material in MZL.

Biological aspects. The specimens were collected at altitudes from 370 m to 2000 m. Further characteristics of sampling sites are given in Englmaier et al. (2020). In Saudi Arabia, the species occurs in aquatic vegetation in still reaches of small to medium-sized streams with sandy substrate (Gattolliat et al. 2018).

Distribution. Ethiopia (Fig. 2b), Saudi Arabia (Gattolliat et al. 2018) and potentially Iran (Tahmasebi et al. 2020).

6. *Labiobaetis vinosus* (Barnard, 1932)

Barnard 1932
Kopelke 1980 (*Pseudocloeon tenuicrinitum*; informal synonym, Kluge 2020)
Gillies 1994: figs 16–26 (*Baetis spatulatus*; formal synonym, Kluge and Novikova 2016)
Lugo-Ortiz and McCafferty 1997: figs 75–86
Kluge and Novikova 2016: figs 113, 122–129, 132, 133 (*L. tenuicrinitus*; informal synonym, Kluge 2020)

Remark. Judging from the figures and description in Kluge and Novikova (2016), there is no morphological difference between *L. vinosus* and *L. tenuicrinitus*. Kluge (2020) also indicates the synonymy of both species. However, no formal synonymy has been established so far. As we have not seen material of *L. tenuicrinitus*, we are not in a position to formally synonymise both species. Further, the genetic barcode (COI) of both species remains unknown.

Differential diagnosis. ***Nymph.*** Following combination of characters: A) colouration: abdomen dorsally brown, with pattern as Kluge and Novikova 2016: fig. 113; B) scape without distolateral process; C) labial palp segment II with broad, thumb-like protuberance; segment III conical; D) maxillary palp segment II with excavation at inner distolateral margin; E) fore femur rather broad, length ca. 3× maximum width; dorsal margin with 8–18 curved, spine-like setae and basally a partial second row of setae; F) hind protoptera absent or minute; G) six pairs of gills.

Examined material. Ethiopia • 6 nymphs; Lafessa; 08°23'16"N, 38°54'31"E; 1600 m; 08.11.2017; leg. W. Graf; Lf1; 1 on slide; GBIFCH00592392; 5 in alcohol; GBIFCH00515562, GBIFCH00763730, GBIFCH00829883, GBIFCH00829884, GBIFCH00829885 • 4 nymphs; Korkada; 08°30'03"N, 39°33'07"E; 1260 m; 10.11.2017; leg. W. Graf; Kk1; 3 in alcohol; GBIFCH00515561; 1 on slide; GBIFCH00592388; all material in MZL.

Biological aspects. The specimens were collected at altitudes of 1260 m and 1600 m. Further characteristics of sampling sites are given in Englmaier et al (2020). Harrison and Hynes (1988) reported the species at 2500 m in marginal vegetation.

Distribution. Ethiopia (Fig. 2b), DR Congo (Kopelke 1980), Tanzania (Gillies 1994), Uganda (Kluge and Novikova 2016), South Africa (Lugo-Ortiz and McCafferty 1997).

Key to the *Labiobaetis* species of Ethiopia (nymphs; excluding *L. bellus*)

1	Six pairs of gills	***L. vinosus***
–	Seven pairs of gills	**2**
2	With distolateral process at scape	**3**
–	Without distolateral process at scape	**4**

3 Maxillary palp with a strongly developed distolateral excavation (Fig. 5g, h), femur dorsally with row of 18 to 27 spine-like setae on margin and a partial row near margin (Fig. 4a), paraproct with 15 to 20 marginal spines (Fig. 4f) .... ***L. excavatus* sp. nov.**

– Maxillary palp with distolateral excavation, femur dorsally with a row of 13 to 18 spine-like setae on margin, paraproct with 21 to 29 marginal spines (Lugo-Ortiz and McCafferty 1997: figs 6, 8, 13) ....***L. latus***

4 Labial palp segment II with broad thumb-like distomedial protuberance (Gattolliat et al. 2018: figs 24, 39) **5**

– Labial palp segment II with narrow thumb-like distomedial protuberance (Gattolliat et al. 2018: fig. 8) ....***L. potamoticus***

5 Body dorsally with pattern as in Gattolliat et al. 2018: fig. 32, femoral patch poorly developed, tibia dorsally with row of short, spatulate setae (Gattolliat et al. 2018: fig. 26) ....***L. alahmadii***

– Body dorsally with pattern as in Gattolliat et al. 2018: fig. 47, femoral patch well developed, tibia dorsally with row of scarce, tiny, stout setae (Gattolliat et al. 2018: fig. 40) ....***L. glaucus***

Genetics

COI sequences were obtained for five species (Table 1); we failed to get a sequence of *L. vinosus*, despite several trials. The genetic distances (K2P) among the species are between 17% and 23%, and therefore much higher than 3.5%, which is generally considered as a likely maximal value for intraspecific divergence (Hebert et al. 2003; Ball et al. 2005; Zhou et al. 2010) (Table 3). Very limited genetic distances (between 0% and 4%) were found between specimens of the same species, as in *L. potamoticus*, *L. excavatus* sp. nov. and *L. alahmadii*.

Discussion

Assignment to *Labiobaetis* and affinities

For the assignment of the new species to *Labiobaetis* we refer to Kluge and Novikova (2014). *Labiobaetis* is characterized by a number of derived characters, some of which are not found in other taxa (Kluge and Novikova 2014): antennal scape sometimes with a distolateral process (Fig. 4g); maxillary palp two segmented with excavation at inner distolateral margin of segment II, excavation may be poorly developed or absent (Fig. 5g); labium with paraglossae widened and glossae diminished; labial palp segment II with distomedial protuberance (Fig. 5i). The concept of *Labiobaetis* is also based on additional characters, summarized and discussed in Kaltenbach and Gattolliat (2018, 2019). *Labiobaetis excavatus* sp. nov. is morphologically related to *L. latus*, sharing the distolateral process at scape, well-developed hind protoptera, seven pairs of gills, and the broad, distomedial protuberance at segment II of the labial palps. The

Table 3. Intraspecific (bold) and interspecific genetic distances of the sequenced specimens (COI; Kimura 2-parameter; %, mean, minimum-maximum).

	Species	Locations	1	2	3	4	5
1	*L. alahmadii*	Ethiopia, Saudi Arabia	**1**				
			0–4				
2	*L. excavatus* sp. nov.	Ethiopia	19	**1**			
			18–20				
3	*L. glaucus*	Ethiopia, Saudi Arabia, South Africa, Mayotte	19	22	**1**		
			18–20	21–23	**0–2**		
4	*L. latus*	Ethiopia	19	21	20	–	
			19–20	21	20–21		
5	*L. potamoticus*	Ethiopia, Saudi Arabia	18	20	19	18	**2**
			17–19	19–20	18–20	17–18	**0–4**

main differences are the stronger distolateral excavation at the maxillary palp of *L. excavatus* sp. nov. (Fig. 5g, h; Lugo-Ortiz and McCafferty 1997: fig. 6), the number of spine-like setae at dorsal margin of femur (18–27 in *L. excavatus* sp. nov., plus a partial second row near margin; 13–18 in *L. latus*) and the presence or absence of setae at the apex of the left mola (present in *L. latus*, absent in *L. excavatus* sp. nov.). The strong distolateral excavation of the maxillary palp is very similar to *L. punctatus* Gattolliat, 2001, from Madagascar, which is also missing the setae at apex of the mola of the left mandible. However, the Malagasy species has no distolateral process at scape and differs by many other characters (Gattolliat 2001: figs 44–54).

Comparison to other realms and species groups

Remarkably, all Afrotropical species of *Labiobaetis* have a submarginal arc of feathered setae on the dorsal surface of the labrum (Gillies 1994; Lugo-Ortiz et al. 1999; Gattolliat 2001; Gattolliat et al. 2018, this study). In contrast, several additional types of these setae were described from all other regions. The majority of species occur in the Oriental realm and New Guinea. In New Guinea, simple setae were the predominant type, but also feathered setae, clavate setae with pectination, dendritic and lanceolate setae with and without pectination were described (Lugo-Ortiz et al. 1999; Kaltenbach and Gattolliat 2018). In Southeast Asia, simple, feathered and clavate setae are predominant and comparably frequent, but also lanceolate and dendritic setae were described (Müller-Liebenau 1984; Shi and Tong 2014; Kaltenbach and Gattolliat 2019, 2020; Kaltenbach et al. 2020). The type of the dorsal, submarginal setae together with the shape of the distomedial protuberance of labial palp segment II and often combined with other characters are building the base for the morphological species groups defined in Southeast Asia and New Guinea (Kaltenbach and Gattolliat 2018, 2019; Kaltenbach et al. 2020). These morphological groups within *Labiobaetis* are primarily a working tool but some may be natural groups and could also serve as a basis for future studies on the generic delimitation and phylogeny of this genus. Afrotropical *Labiobaetis* are not only sharing the feathered type of dorsal, submarginal setae on the labrum, but also have mostly a broad thumb-like distomedial protuberance of labial palps segment II. A lot of the variation between the species is coming from different combinations of characters like seven or six pairs of gills, presence or absence of hind protoptera and presence or absence of a distolateral process at scape. The reduction and secondary loss of these characters seems to be a general tendency in *Labiobaetis* (Kluge and Novikova 2014; Kaltenbach and Gattolliat 2018, 2019) and they are, therefore, less reliable characters to define morphological groups. There are a few species with a narrow distolateral protuberance at labial palps segment II (*L. piscis* Lugo-Ortiz & McCafferty, 1997; *L. longicercus* Gattolliat, 2001; *L. potamoticus*), which are at the same time sharing seven pairs of gills, the absence of a distolateral process at scape and, more important, the absence of setae at the apex of the mola of the left mandible. These species are probably forming a morphological group amongst the other Afrotropical species. However, this is out of the scope of this paper and further investigations on other Afrotropical regions are necessary to discuss possible relationships of *Labiobaetis* species in this realm. Based on the present knowledge, all Afrotropical species of *Labiobaetis* seem to be morphologically closely related to the Southeast Asian *operosus* and *difficilis* groups (Kaltenbach and Gattolliat 2019). Both groups are very close to each other; the only difference is the presence (*operosus* group) or absence (*difficilis* group) of hind protoptera, which is a rather unreliable group character (see above).

The distribution of the *Labiobaetis* species seems to be also different in the Afrotropical realm compared to Southeast Asia and New Guinea. Apart from Madagascar, where all *Labiobaetis* species are endemic to the island (Gattolliat 2001), some Afrotropical species have a wide or even very wide distribution, e.g. *L. potamoticus* (Saudi Arabia, Ethiopia, potentially Iran), *L. latus* (Ethiopia, Kenya, South Africa), *L. vinosus* (Ethiopia, DR Congo, Tanzania, Uganda, South Africa) and especially *L. glaucus* (Ethiopia, Iran (?), Saudi Arabia, Comoros, Kenya, Namibia, Zimbabwe, South Africa). On the contrary, most species in Southeast Asia and New Guinea are restricted to smaller regions or are endemic to one island. An exception is *L. moriharai* Müller-Liebenau, 1984, known from Malaysia, Vietnam and Borneo (Kaltenbach and Gattolliat 2018, 2019, 2020; Kaltenbach et al. 2020). The reason for this difference is probably due to the high number of islands in Southeast Asia, especially in Indonesia and the Philippines, and the extreme landscape structure in New Guinea, facilitating allopatric speciation and endemicity (Toussaint et al. 2013, 2014; Kaltenbach and Gattolliat 2018, 2019; Kaltenbach et al. 2020). The huge African continent is in comparison geographically less structured, which is generally facilitating larger distribution areas of species.

Labiobaetis bellus

Since its description as a new species by Barnard (1932), *L. bellus* was regularly reported from South Africa and other countries, mainly in ecological studies of rivers (e.g. Crass 1947; Harrison 1950; Kimmins 1960; Oliff and King 1964; Chutter 1970, 1971; Harrison and Hynes 1988; Samways et al. 2011). However, apart from a rather sketchy drawing of the labial palp (Barnard 1932: fig. 13k), there are no further drawings of the mouthparts in Barnard (1932) and his description of the nymph is not precise enough to differentiate it unambiguously from other species. Additionally, he mentioned that *L. bellus* and *Cheleocloeon excisum* (Barnard, 1932) "...approach each other very closely in the character of the mouth-parts of the nymphs." (Barnard 1932: 204). Later, already Kimmins (1960) was not sure about his determination of "*Baetis* ? *bellus*" from Uganda and proposed to solve the determination issues by studying nymphs rather than adults. Lugo-Ortiz and McCafferty (1997) did not mention *L. bellus* at all in their comprehensive study on Afrotropical *Labiobaetis*, contrary to *L. vinosus*, which Barnard (1932) described in the same paper. We may assume that these authors could not clarify the identity and the status of *L. bellus*. It remains unclear what Harrison and Hynes (1988) and other authors include in their concept of "*L. bellus*". Moreover, most of the reports of the species were anterior to the revision of the genus in the Afrotropics (Lugo-Ortiz and McCafferty 1997) and must be therefore considered as uncertain. Therefore, we refrain from further treatment of *L. bellus* before its species concept is clarified based on material from South Africa.

In comparison to *L. excavatus* sp. nov. with its broad distomedial protuberance at labial palp segment II similar to *L. latus*, the drawing of *L. bellus* in Barnard 1932: fig. 13k shows a more slender protuberance, more similar to *L. piscis* and *L. potamoticus*; *Labiobaetis piscis* and *L. potamoticus* may be easily confused with each other and *L. potamoticus* is abundant in the Awash River. In addition, *L. bellus* was reported from several places and different altitudes in the Awash River, contrary to *L. excavatus* sp. nov., which was found in the natural Chilimo Forest (2400 m) only, despite intensive sampling efforts along the Awash River. Further, *L. excavatus* sp. nov. is very similar to *L. latus*, which is reported additionally to *L. bellus* by Harrison and Hynes (1988). Therefore, we may assume that "*L. bellus*" sensu Harrison and Hynes (1988) has obvious differences to *L. latus* and thus to *L. excavatus* sp. nov. as well. As a conclusion, we assume that *L. excavatus* sp. nov. cannot be conspecific with *L. bellus*, the latter species being in the need of a taxonomic revision.

Genetic distance

The interspecific genetic distances found in Ethiopia (17–23%, Table 3) are in line with the ones between *Labiobaetis* species in other regions like New Guinea (average 22%; Kaltenbach and Gattolliat 2018), Indonesia (11–24%; Kaltenbach and Gattolliat 2019), Borneo (19–25%; Kaltenbach and Gattolliat 2020) and the Philippines (15–27%; Kaltenbach et al. 2020). Ball et al. (2005) reported a mean interspecific, congeneric distance of 18% for mayflies from the United States and Canada.

Two species, *L. alahmadii* and *L. potamoticus*, have intraspecific distances of up to 4%. In *L. alahmadii*, two specimens from Ethiopia have of genetic distance of 3%–4% to all other sequenced specimens from Ethiopia and Saudi Arabia. All other specimens have distances of 0%–1% between themselves, as well in Ethiopia as between Ethiopia and Saudi Arabia. Intraspecific distances of 4%–6% were also reported in some cases for *Labiobaetis* species in New Guinea, Indonesia, Borneo and the Philippines (Kaltenbach and Gattolliat 2018, 2019, 2020; Kaltenbach et al. 2020), as well as in aquatic beetles in the Philippines (Komarek and Freitag 2020). Ball et al. (2005) also reported a case with 6% intraspecific distance in a mayfly in North America and intraspecific K2P distances of more than 3.5% are not uncommon within Plecoptera as well (Gill et al. 2015; Gattolliat et al. 2016). In *L. potamoticus*, the specimens from Ethiopia have distances of 0–1% between each other, and the higher distances of 3–4% are only between specimens from Ethiopia and Saudi Arabia, which can be explained by the greater geographic distance.

The COI sequence of *L. latus* from Ethiopia has a distance of 22% to another specimen from South Africa, reported in Gattolliat et al. (2018: table 1; GenBank MH070297, GBIF00465142), without any morphological difference between the two specimens. In the meantime, a second specimen from the same location in South Africa was sequenced and has the same barcode as the first specimen. Further, several COI barcodes with a distance of just 5–6% to the one from Ethiopia were obtained from specimens in South Africa as well, which may be explained by the geographic distance between Ethiopia and South Africa. There seem to be two different widespread mitochondrial lineages corresponding to the morphological concept of *L. latus*. This problem cannot be solved without additional investigations, including in particular nuclear genes, as it was recently done in the similar case of *Baetis harrisoni* Barnard, 1932 (Pereira da Conceicoa et al. 2012). Different mitochondrial lineages with the same morphology were already reported several times in *Labiobaetis* (Kaltenbach and Gattolliat 2018, 2019; Kaltenbach et al. 2020).

The number of sampled localities and different habitats in Ethiopia is still limited and there are regions without any collection activities so far (Fig. 2). However, the distribution of *Labiobaetis* species in Africa is often much more widespread than in other regions and suitable habitats are limited in this semiarid area. Therefore, we may expect a few, but not many more species to be discovered in Ethiopia with further collections.

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RESEARCH ARTICLE

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The first record of *Omosita nearctica* Kirejtshuk (Coleoptera, Nitidulidae) in South Africa, with the first description of its mature larva

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Abstract

Sap beetles of the genus *Omosita* Erichson are stored-product pests that are also associated with carrion, potentially making them biosecurity risks and forensic tools. The discovery of a specimen of the Nearctic species *Omosita nearctica* Kirejtshuk in South Africa prompted an investigation a decade later to determine if this species had established itself in the country, which was confirmed by the collection of further breeding specimens that also facilitated the first description of mature larvae of *O. nearctica*. A new key to adults of all *Omosita* species is presented.

Keywords

Biosecurity, forensic entomology, invasion biology, larval morphology, molecular identification, morphological key

Introduction

Many insects associated with stored products have been moved between continents following humans' colonisation of new places. In the case of cryptogenic species, this invasion process has been so thorough that the geographical origin of the insect invaders is no longer clear, e.g. the Hide Beetle, *Dermestes maculatus* DeGeer, 1774 (Coleoptera: Dermestidae) (Mroczkowski 1968). In other cases, these invasive species are not noticed for years even though they may be well-known pests in other countries, e.g. the Oriental Latrine Fly, *Chrysomya megacephala* (Fabricius, 1794) (Diptera: Calliphoridae) in South Africa (Williams and Villet 2006; Badenhorst and Villet 2018). Insects, and particularly beetles (Midgley et al. 2009), associated with stored animal products, are often of significance in forensic entomology and biosecurity, and keeping track of new members of the carrion insect community in a particular country is important in both of these contexts.

The sap beetle family Nitidulidae has approximately 350 genera and over 4500 species (Lee et al. 2020). The Nitidulidae in Africa have not been well studied and so what is known of them is limited (Kirejtshuk 2001). There are seven recognised species in the genus *Omosita* Erichson, 1843 – O. *discoidea*, *O. colon*, *O. depressa*, *O. funesta*, *O. smetanai*, *O. japonica* and *O. nearctica* (Reitter 1873, 1874; Kirejtshuk 1987; Lee et al. 2015). A specimen of *O. discoidea* in the Naturhistoriska Riksmuseet, Stockholm*, was collected by Gustav de Vylder (Lee et al. 2015), probably during his stays in Cape Town in 1871–1873 and 1879–1885 (de Vylder 1998); no other published records of *Omosita* in the Afrotropical Region were found.

At least some sap beetles of the genus *Omosita* are relevant in forensic entomological and biosecurity contexts because they are occasional pests of stored products and can be abundant on carrion and corpses (Hinton 1945; Shubeck et al. 1977; Jelínek 1999; Kočárek 2003; Ewing and Cline 2005; Schlechter 2008; Saloña et al. 2010; Lee et al. 2015; Lyu et al. 2016; Torres et al. 2018; Lee et al. 2020). Several *Omosita* species have been translocated around the globe, e.g. the Palaearctic species *Omosita colon* (Linnaeus, 1758) and *Omosita discoidea* (Fabricius, 1775) have been reported from Australia and New Zealand (Blackburn 1903; Carlton and Leschen 2007); *O. colon* has been recorded on Pitt Island, 800 km east of New Zealand (Alfken 1904; Emberson 1998); and the Mexican species *Omosita funesta* Reitter, 1873 is reported from Spain (Audisio 1990). Despite their applied significance and widespread distribution, literature about the distribution of *Omosita* species is demonstrably scattered.

Omosita nearctica Kirejtshuk, 1987 was described from North America (Kirejtshuk 1987), but nothing has yet been published about its biology. Some North American records of *O. colon* published or identified before 1987 may actually represent *O. nearctica*, which was only recognised as a separate species in that year (Kirejtshuk 1987).

* The report of a specimen in the Natural History Museum, London (Lee et al. 2015) is a *lapsus calami* (Kirejtshuk, pers. comm.).

The collection of a single specimen of *Omosita nearctica* in August 2001 in South Africa suggested the introduction of *O. nearctica* to this country. This paper reports this discovery, confirms the breeding of *O. nearctica* in South Africa, and provides the first description of its larva.

Materials and methods

Specimen collection

An adult specimen of *Omosita nearctica* was collected in a trap baited with 50 g of fresh chicken liver in Makhanda (formerly Grahamstown), Eastern Cape province, South Africa, in August 2001, during a study of the seasonal distribution of forensically important flies (Villet et al. 2017; Williams and Villet 2019). The specimen was discovered in 2012 among the ethanol-preserved flies. It was mounted and deposited in the Albany Museum, Makhanda, South Africa (specimen number AM 66416[**]).

Cooked sheep shank bones were placed in custom-made traps hung about 50 cm above ground in trees at municipal rubbish dumps (or landfills) in Makhanda (33.291°S, 26.492°E) in February 2012 and 2013, and nearby Port Alfred (33.568°S, 26.879°E) in February 2013. The traps were checked regularly and when beetles were caught, they were taken back to Rhodes University and caged with uncooked beef shin bones. Larvae were discovered feeding on the fatty bones in March 2013. The adults (unsexed) and larvae were preserved in 96% ethanol. Five larval specimens were deposited in the wet collection of the KwaZulu-Natal Museum, Pietermaritzburg, South Africa (specimen number NMSA-COL 1405–1409). Adult specimens were card mounted and two specimens were deposited in the KwaZulu-Natal Museum (specimen number NMSA-COL 1898 and NMSA-COL 1410), two in the South African National Collection of Insects, Pretoria, South Africa (accession number SANC-COLG-00021) and two in the Albany Museum, Makhanda, South Africa (specimen numbers AM 101483 and AM 101484).

Identification

The adult beetles (n = 28) were identified from their morphology using the keys in Jelínek (1999) and Lee et al. (2015) and the description and illustrations in Kirejtshuk (1987). A new diagnostic key to the adults of the seven accepted species of *Omosita* is presented in Appendix 1.

One hind leg of a single beetle (NMSA-COL 1898) was used for DNA analysis. DNA was extracted using the Qiagen DNeasy tissue kit (Qiagen, Inc., Valencia, CA)

** This specimen is misidentified on the Global Biodiversity Information Facility (GBIF) as *Omosita japonica* (Gess and Ranwashe 2017).

according to the manufacturer's instructions. A portion of the cytochrome oxidase I (COI) gene was sequenced using the LCO1490 forward (5'-GGTCAACAAATCATAAAGATATTGG-3') and HCO2198 reverse (5'-TAAACTTCAGGGTGACCAAAAAAT-3') primers. Polymerase chain reaction (PCR) amplification was conducted and the PCR product was sequenced by Macrogen Inc, Seoul, South Korea (https://dna.macrogen-europe.com/). The COI sequence was run through the Basic Local Alignment Search Tool (BLAST – https://blast.ncbi.nlm.nih.gov) to confirm the morphological identification.

To facilitate comparative biology, a molecular phylogeny of four of the seven species of *Omosita* was estimated. Additional COI sequences of the four widespread *Omosita* species were downloaded from the Barcode of Life Data System v4 (BOLD) (Table 1) and analysed together with the new sequence. *Brachypeplus glaber* LeConte (Nitidulidae: Cillaeinae) and two species of *Nitidula* Fabricius (Nitidulidae: Nitidulinae) were used as outgroups. Bayesian inference analyses were performed with MrBayes (Huelsenbeck and Ronquist 2001) using the best-fitting nucleotide substitution mode (GTR+G) from jModelTest (Posada 2008). One cold and three hot chains were run for 5 000 000 generations, sampling every 1 000 generations with burn-in of 1 000 samples (20%).

Larval morphology

Three mature larvae were prepared for scanning electron microscopy (SEM) by critical-point drying and sputter-coating with gold (NMSA-COL 1402). The specimens were viewed with a Zeiss Evo LS 15 SEM at the University of KwaZulu-Natal's Microscopy and Microanalysis Unit, Pietermaritzburg, South Africa. Two mature larvae were slide mounted using standard protocols and viewed using a Leica compound microscope (NMSA-COL 1403 and 1404). A further five mature larvae were examined using a Leica dissecting microscope (NMSA-COL 1405–1409). Measurements were taken using a graduated eye-piece.

Results

Morphological identification

Twenty-eight adult specimens of *Omosita* were collected in Makhanda (1 in 2001, 12 in February 2012 and 15 in February 2013) but none in Port Alfred. The beetles keyed out as *Omosita colon* using the keys to Palaearctic species of *Omosita* presented by Jelínek (1999) and Lee et al. (2015), but these keys necessarily do not include *O. nearctica*, which is as yet unknown from the Palaearctic. Kirejtshuk (1987) compared his newly described *O. nearctica* with *O. colon* and his description and figures confirmed that our specimens were *O. nearctica*.

Table 1. Sequences from NCBI GenBank and BOLD used in the Bayesian inference analysis. New sequences are set in bold typeface.

Species	Location	GenBank accession number	BOLD Sequence ID
Omosita colon	Athenstedt, Germany	KU907100	GCOL10982-16.COI-5P
	Athenstedt, Germany	KU910800	GCOL10988-16.COI-5P
	Edenkoben-Rhodt, Villa Ludwigshoehe, Germany	KM441201	FBCOO036-13.COI-5P
	Haembach, Haembacher Teich, Halde, Germany	KU913847	GCOL5018-16.COI-5P
	Hailiniemi, Finland	KJ965999	COLFE1417-13.COI-5P
	Hailiniemi, Finland	KJ966608	COLFE1416-13.COI-5P
	Kallvik, Helsinki, Finland	KJ965633	COLFD167-12.COI-5P
	Kallvik, Helsinki, Finland	KJ967401	COLFD168-12.COI-5P
	Lauttasaari, Finland	KJ965605	COLFE421-12.COI-5P
	Nobitz-Klausa, Leinawald, Germany	KM446224	GBCOL020-12.COI-5P
	Wesel-Diersfordt, Diersfordter Wald Gatter, Germany	KM452483	FBCOC604-10.COI-5P
Omosita depressa	Arnsberg-Breitenbruch, NWZ Hellerberg, Germany	KM442498	FBCOH678-12.COI-5P
	Bornheim-Hemmerich, Ortslage, Germany	KM446940	FBCOG1013-12.COI-5P
	Nobitz-Klausa, Leinawald, Germany	KM449233	GBCOC743-12.COI-5P
	Oberheimbach, Franzosenkopf, Germany	KM439454	GBCOE444-13.COI-5P
Omosita discoidea	Bornheim-Hemmerich, Ortslage, Germany	KU919455	GCOL7562-16.COI-5P
	Langenthal, Germany	KU912774	GCOL9483-16.COI-5P
	Rowe Tamarack Trail, Canada	KM849291	SSWLC101-13.COI-5P
	Saalealtarm, Germany	KU909461	GCOL9547-16.COI-5P
	Schaidt, NWR Stuttpferch, Germany	KM445991	FBCOE490-12.COI-5P
	Staerkerwald, Germany	KU916825	GCOL7701-16.COI-5P
	Wandersleben, Burg Gleichen, Germany	KU919608	GCOL9399-16.COI-5P
Omosita nearctica	Charitable Research Reserve, Canada	MG054067	RRSSC3383-15.COI-5P
Omosita nearctica	**Makhanda (previously Grahamstown), South Africa**	**MT371766**	–
Omosita nearctica[a]	Puslinch, Canada	MG058703	COLON045-10.COI-5P
Omosita nearctica	Sable Island National Park Reserve, Canada	KR916043	CNSIB573-15.COI-5P
Omosita sp.	Kawartha Lakes, Canada	–	BARSL067-16.COI-5P
Outgroups			
Brachypeplus glaber	United States of America	KC491232	GBCL15295-13.COI-5P
Nitidula bipunctata	Rana u Loun, Oblik, Czech Republic	KM452114	GBCOU1431-13.COI-5P
	Langenthal, Germany	KU909854	GCOL9484-16.COI-5P
	Wandersleben, Burg Gleichen, Germany	KU908969	GCOL9400-16.COI-5P
		KU918404	GCOL9401-16.COI-5P
Nitidula rufipes	Hailiniemi, Finland	KJ962313	COLFE1409-13.COI-5P
		KJ965428	COLFE1410-13.COI-5P
		KJ963473	COLFE1411-13.COI-5P
		KJ964776	COLFE1412-13.COI-5P
	Rana u Loun, Oblik, Czech Republic	KM440272	GBCOU1469-13.COI-5P
		KM443376	GBCOU1470-13.COI-5P
		KM441409	GBCOU1861-13.COI-5P
		KU915079	GCOL6778-16.COI-5P

[a] Misidentification (see Fig. 2).

Molecular identification

The partial COI sequence from one specimen (Genbank accession number: MT371766, NMSA-COL 1898) was 656 bp long and aligned easily with the other sequences. It had a 100% BLAST match to *O. nearctica*, with the highest match to *O. colon* at 89.31% (Table 2). In the Bayesian inference tree (Fig. 2), the new sequence forms a clade exclusively containing other *O. nearctica* sequences.

Table 2. BLAST metrics of similarity for *Omosita nearctica* sequence from Makhanda, South Africa.

Species	% Coverage	% Match	E-value
Omosita nearctica	100%	100%	0.0
Omosita colon	99%	89.3%	0.0
Omosita discoidea	99%	88.21%	0.0
Omosita depressa	–	No significant similarity	
Nitidula rufipes	100%	87.82%	0.0
Nitidula bipunctata	–	No significant similarity	

Taxonomy

Diagnosis of adult

Body length 2.4–3.7 mm, oblong ovate, sparsely pubescent, testaceous except for piceous markings on anterior half of elytra, and pale markings on lateral pronotal margins and posterior half of elytra; antennal club not longer than wide; pronotum transverse, concave anteriorly and arcuate laterally, with sides converging more apically than basally, with two oval depressions before scutellum; elytra jointly at least 0.75 as wide as their length, their apices obliquely rounded, forming a common arc and usually exposing one abdominal tergite (Fig. 1). The phallobase is subparallel, with the parameres fused and not divergent; the tegmen is anteriorly transverse and shallowly excavate apically.

Omosita colon differs most notably from *O. nearctica* in the shape of the antennal club which is elongate-oval, much longer than wide and its body shape which is oval. *Omosita discoidea* differs from *O. nearctica* in the pronotum colour which is black in the centre and testaceous towards the edges and the antennal club which is longer than wide (Kirejtshuk 1987; Lee et al. 2015)

Description of mature larva

Measurements. Body length 4 mm. Head capsule 0.5 mm wide.

Body (Fig. 3). Body campodeiform; subdepressed; widest in abdominal region; white or yellow; uniformly pigmented; poorly sclerotised. Head and all terga with scattered setae; body setae with apices entire.

Head (Figs 4–6). Head capsule (Fig. 4) 2.3 times as wide as long (excluding the labrum); trapezoidal, tapered towards mouthparts; lateral margins straight, at most gently convex; dorsal hind margin slightly retracted; ventral hind margin strongly retracted; granular or tuberculate; with one dorsal and no ventral stemma on each side. Antenna with three antennomeres. Basal antennomere almost as long as wide; without setae. Second antennomere as long as or slightly longer than first; with mesal, subapical sensory area bearing a large cone; with sensory appendix about two thirds the length of third antennomere; with setae, including one directly proximal to sensory area. Third antennomere about as long as basal antennomere; setose with a group of minute apical setae. Frontal sutures impressed, reaching near antennal insertions; frontoclypeal suture distinct laterally, obsolete medially. Clypeus trap-

Figure 1. *Omosita nearctica* adult, dorsal and ventral view, captured in February 2013 in Makhanda, South Africa. Scale bar: 0.5 mm.

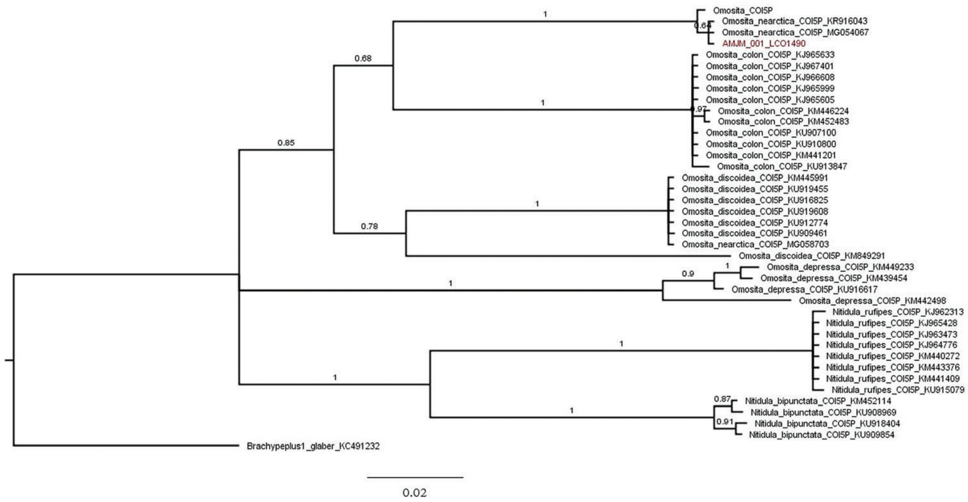


Figure 2. Bayesian inference tree of COI sequences. Posterior probability values are shown on branches. Red text is the South African sequence generated in this study.

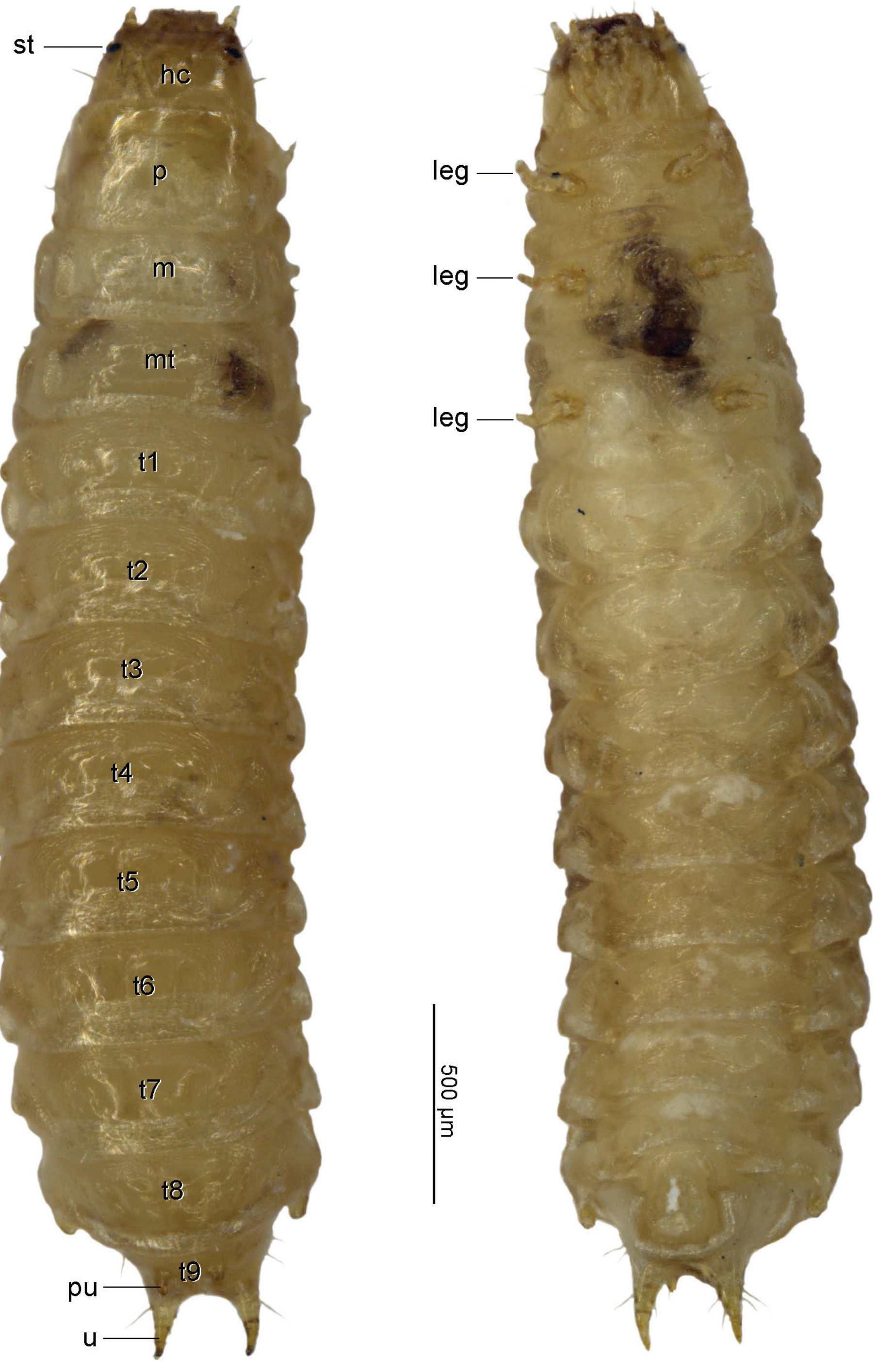
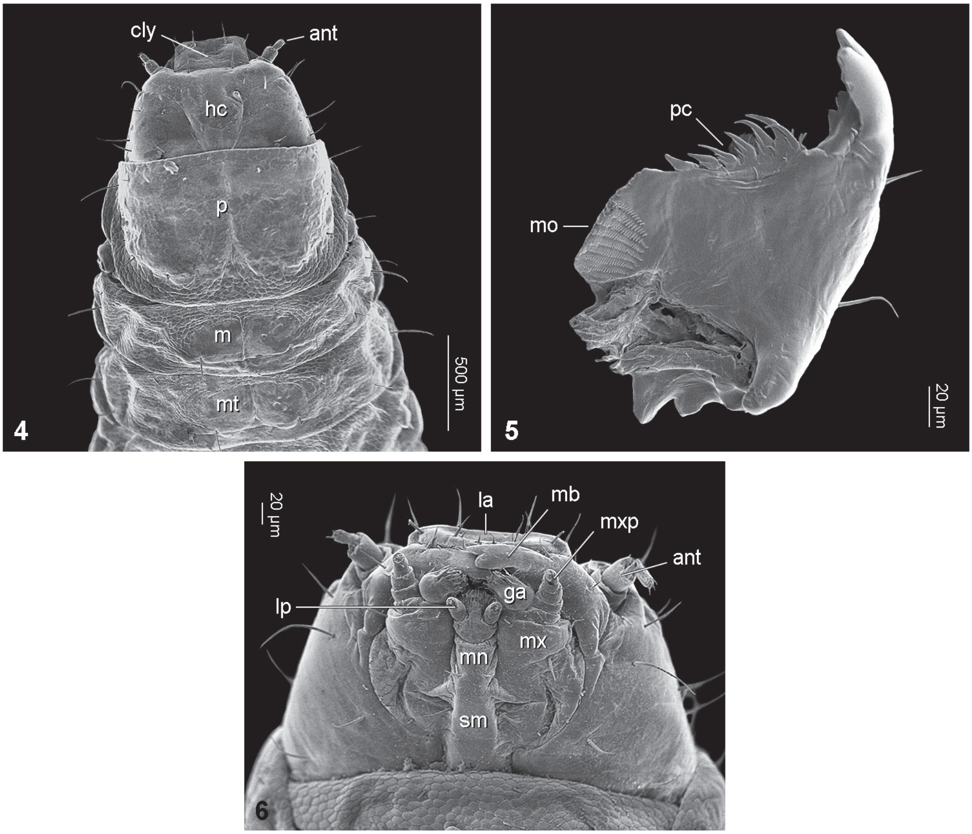


Figure 3. *Omosita nearctica* larva – dorsal (L) and ventral (R) views. hc = head capsule m = mesothorax, mt = metathorax, p = prothorax, pu = pregomphus, sp = spiracle, st = stemmata, u = urogomphus, 1–9 = abdominal tergites. Scale bar: 0.5 mm.

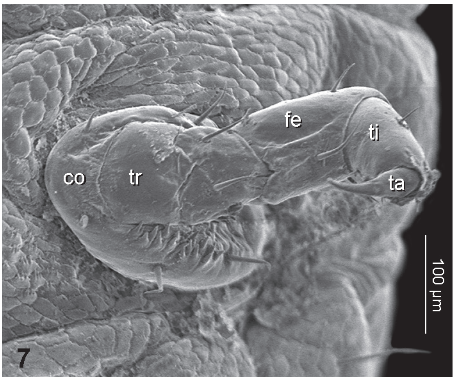


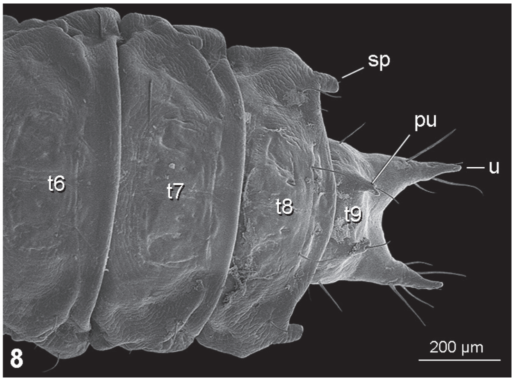
Figures 4–6. 4 SEM dorsal view of head capsule and thorax of *Omosita nearctica* larva. ant = antenna, cly = clypeus, hc = head capsule, m = mesothorax, mt = metathorax, p = prothorax **5** SEM ventral view of left mandible of *Omosita nearctica* larva. mo = mola, pc = prostheca **6** SEM ventral view of head of *Omosita nearctica* larva. ant = antenna, la = labrum, lp = labial palp, mb = mandible, mn = mentum, mx = maxilla, mxp = maxillary palp, sm = submentum. Scale bars: 500 µm (**4**), 20 µm (**5**, **6**).

ezoidal; with three pairs of submarginal setae; clypeal protuberances weak. Clypeo-labral suture nearly straight.

Mandible (Fig. 5) apex bidentate; with two subequal lateroventral setae. Prostheca consists of several large lobes; bearing a lightly sclerotized projection at base. Mola transversely ridged. Maxilla elongated. Maxillary palp three-segmented; with third joint longer than first or second. Galea with large, dense apical brush. Lacinia partially fused to galea. Mala enlarged inner-distally; bearing rather sparsely scattered microtrichia. Labium about 1.5 times as long as wide. Labial palp one-segmented; set close at base of labium. Ligula strongly produced. Mentum indistinctly separated from submentum. Submentum with two pairs of setae, one proximal and one distal (Fig. 6).

Thorax (Figs 4, 7). Thoracic tergites (Fig. 4) partially spanning dorsum; medially divided into paratergites. Meso- and metathoracic paraterga small; transversely rectangular; weakly rugose; slightly raised and set close together on mesothorax and touching on metathorax.





Figures 7, 8. 7 SEM of hind leg of *Omosita nearctica* larva. co = coxa, fe = femur, ti = tibia, tr = tarsungulus **8** SEM dorsal view of final segments of the abdomen of *Omosita nearctica* larva. pu = pregomphus, sp = spiracle, u = urogomphus, 6–9 = abdominal tergites. Scale bars: 100 µm (**7**), 200 µm (**8**).

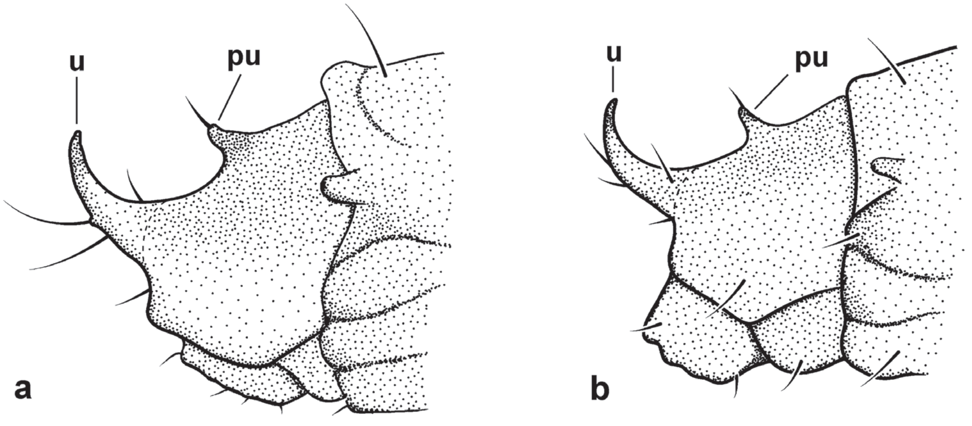


Figure 9. Lateral view of terminal end of *Omosita nearctica* (**a**) and *O. colon* (**b**). pu = pregomphus, u = urogomphus. Not to same scale.

Legs (Fig. 7). Femur 1.5 times longer than wide. Tibia twice as long as wide. Tarsungulus slightly longer than half of tibia; moderately, evenly curved. Forelegs slightly shorter than other legs.

Abdomen (Figs 3, 8, 9). Abdomen about three times as long as thorax (Fig. 3). Abdominal tergites T1-T8 about one fourth as wide as body; medially divided into paratergites. Abdominal paratergites transversely rectangular, weakly rugose, slightly raised, and touching. Pregomphi on ninth tergite, small. Urogomphi (Fig. 8) on ninth tergite unsegmented, half the length of ninth tergum; (viewed dorsally) parallel; (viewed laterally) gradually recurved anteriorly (Fig. 9a). Abdominal spiracles exposed; in posterolateral angles of segment. Spiracular tubes present, longer on segments A7 and, particularly, A8; on A8, as wide as tall. Abdominal sternites unsclerotised; intersternal membranes with shagreened patch along anterior margin.

Discussion

This study presents the first record of *Omosita nearctica* in South Africa and confirms that it is established as a self-sustaining, breeding alien invasive species in the Eastern Cape Province of South Africa. The COI gene (Fig. 2) agreed with the morphological identification of the beetles as *O. nearctica*. The sequence from this study grouped together in a clade with three other sequences of *O. nearctica* that were separated from its sister clade, *O. colon*, with 100% posterior probability (Fig. 2). One sequence (BOLD Public Record COLON045-10.COI-5P) identified as *O. nearctica* grouped unambiguously with the *O. discoidea* clade.

The morphological character states listed in Table 3 may be used to differentiate the mature larva of *O. nearctica* from that of *O. colon*, the only other species of *Omosita* for which the larva has been described (Eichelbaum 1903; Verhoeff 1923; Hinton 1945; Böving and Rozen 1962; Hayashi 1978; Díaz-Aranda et al. 2018). The description of the urogomphi of *O. colon* by Hayashi (1978) differs from the description by Díaz-Aranda et al. (2018). Hayashi (1978) describes them as short and Díaz-Aranda et al. (2018) states they are half the length of the ninth tergite which appears to be more accurate (Fig 9b). It must be noted that the pregomphi and urogomphi are all referred to as urogomphi by Díaz-Aranda et al. (2018). It is crucial to recognise that because *O. nearctica* was recognised only in 1987, prior references to *O. colon* larvae from the Nearctic (e.g. Hinton 1945; Böving and Rozen 1962) may be in error.

The collection of adults in Makhanda in 2001, 2012 and 2013 confirmed that *O. nearctica* has probably established in South Africa. This is important in the global context of this species as it has apparently never been recorded outside North America (GBIF.org 2020). The small size, furtive habits and internationally traded diets of sap beetles in general make them good candidates for transport around the world. For instance, at least 32 extralimital species have established in Europe (Jelínek et al. 2016). Most of these species feed on ripening and decaying fruit, but *O. funesta* was imported from Mexico to Teruel, Spain in 1931, "probably on imported sausages" (Jelínek et al.

Table 3. Character states differentiating the known larvae of *Omosita* species. The character states for *O. colon* were derived from consideration of descriptions by Eichelbaum (1903), Verhoeff (1923), Hayashi (1978), Díaz-Aranda et al. (2018). North American descriptions of larvae of *O. colon* that predate the description of *O. nearctica* (Hinton 1945; Böving and Rozen 1962; Díaz-Aranda et al. 2018) were not used because they may involve unwitting misidentifications.

Character	Character state	
	Omosita nearctica	***Omosita colon***
Head capsule	2.3 times as wide as long (excluding labrum)	1.4 times as wide as long (excluding labrum)
2nd antennomere	with setae, including one directly proximal to sensory area	without setae
Sensory appendix of 2nd antennomere	about two thirds as long as 3rd antennomere	about half as long as 3rd antennomere
Mola	transversely ridged	transversely ridged and asperated
Abdominal paratergites	touching in midline	set fairly close together but not touching in midline
Spiracular tubes on A8	as wide as tall	wider than tall

2016). Species of *Omosita* are generally associated with human middens and animal remains (Hinton 1945; Shubeck et al. 1977; Jelínek 1999; Kočárek 2003; Ewing and Cline 2005; Schlechter 2008; Saloña et al. 2010; Lee et al. 2015; Lyu et al. 2016; Torres et al. 2018), so it is less obvious how they were transported to Africa. *Omosita nearctica* was probably introduced to South Africa on stored products imported through a port or airport. Given the age and remoteness of some austral introductions of *Omosita* (Blackburn 1903; Alfken 1904; Jelínek et al. 2016), it is possible that the population established well before it was discovered.

Their presence in Makhanda (E. Cape, RSA) suggests that they have been in South Africa for many years, since the town has no international airport and the nearest commercial harbours are over 120 km away. The failure to find specimens in Port Alfred (E. Cape, RSA) is ambiguous evidence of the species' distribution because the sampling effort was limited.

Nothing is published about the biology of *O. nearctica* (Kirejtshuk, 1987). That *O. nearctica* larvae feed on cooked sheep bones suggests that this species feeds on saponified oils and decomposing material, like at least some other species in its genus (Lee et al. 2015; Lyu et al. 2016). In China, *O. colon* was the only species of beetle observed breaking down adipocere on corpses, potentially giving that species specific significance in medico-criminal forensic entomology (Lyu et al. 2016). The similar diets and close relationship (Fig. 2) of *O. colon* and *O. nearctica* imply that the latter species may be similarly useful (Midgley et al. 2009). Beetles associated with stored animal products are often relevant to biosecurity. Further studies on the biology of this species should monitor its global spread and determine its usefulness in forensic entomology. The description of the mature larva will assist in identifying this species where only larvae are found associated with stored products, corpses or carcasses.

Acknowledgements

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Appendix 1

Key to adults of the species of the genus *Omosita* (based on diagnostic character states proposed by Reitter 1873, 1874; Kirejtshuk 1987; Jelínek 1999 and Lee et al 2015).

1 Pronotum with convex median area not demarcated from explanate lateral margins by grooves **2**

– Pronotum with convex median area demarcated from explanate lateral margins by roughly parallel, arcuate grooves **5**

2(1) Antennal club elongate-oval, distinctly longer than wide **3**

– Antennal club rounded or subtriangular, not longer than wide **4**

3(2) Elytra 1.5 times longer than their combined width. Pronotum narrowly explanate laterally; anterior margin shallowly, arcuately notched. Antennal club not constricted in middle .... ***Omosita funesta***

– Elytra at most 1.3 times longer than their combined width. Pronotum widely explanate laterally; anterior margin deeply notched; Antennal club constricted in middle .... ***Omosita discoidea***

4(2) Antennal club rounded, about as long as wide. Mentum without distinct sulcus along posterior border .... ***Omosita nearctica***

– Antennal club broad or subquadrangular to obovate to trapezoidal or subtriangular, usually shorter than wide. Mentum with distinct transverse sulcus along posterior border .... ***Omosita japonica***

5(1) Grooves between convex median area of pronotum and its explanate margins indistinct .... ***Omosita colon***

– Grooves between convex median area of pronotum and its explanate margins distinct **6**

6(5) Pronotum narrowly explanate laterally. Antennal club not constricted in middle. Postmentum with lateral margins raised and sharp; its punctation rugose .... ***Omosita smetanai***

– Pronotum widely explanate laterally. Antennal club constricted in middle. Postmentum with lateral edges margins; its punctation simple and widely spaced .... ***Omosita depressa***

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RESEARCH ARTICLE

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Three new species of the genus *Toxoniella* (Araneae, Liocranidae) from Mount Kenya National Park, Kenya

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Abstract

Three new species of the genus *Toxoniella* Warui & Jocqué, 2002 of the family Liocranidae Simon, 1897 are described from Kenya: *T. tharaka* Oketch & Li, **sp. nov.**, *T. waruii* Oketch & Li, **sp. nov.**, and *T. nyeri* Oketch & Li, **sp. nov.** Types are deposited in the National Museums of Kenya (NMK), Nairobi, Kenya.

Keywords

Epigyne, shady forest, spider, taxonomy

Introduction

Spiders of the family Liocranidae Simon, 1897 are small to medium-sized (3–8 mm long) and live freely in diverse habitats such as heathland, dry and rocky areas, and sometimes in loose leaf litter or woody debris in shady forests (Roberts 1985; Deeleman-Reinhold 2001; Lecigne 2016; Platnick 2020). The family currently contains 33 genera and 290 species worldwide (WSC 2021; Li 2020). Before the current study, five liocranid species belonging to the genera *Andromma* Simon, 1893, *Cteniogaster* Bosselaers & Jocqué, 2013, *Mesiotelus* Caporiacco, 1949, and *Toxoniella* Warui & Jocqué, 2002 were known from Kenya (Kioko et al. 2021).

Toxoniella was first described in the family Gallieniellidae Millot, 1947 before being transferred to Liocranidae by Bosselaers and Jocqué (2013). It was formerly composed of two species: *Toxoniella taitensis* Warui & Jocqué, 2002 and *T. rogoae* Warui & Jocqué, 2002, both endemic to Kenya. *Toxoniella* can be distinguished from other Liocranidae genera by the presence of a posterior tegular extension without a sperm duct in the male palp, a vulva with two pairs of round spermathecae, legs with obvious spination, with anterior leg pairs less spiny than posterior pairs (Warui and Jocqué 2002). In this paper, three new species, *Toxoniella tharaka* sp. nov., *T. waruii* sp. nov., and *T. nyeri* sp. nov. are described based on somatic and genitalic morphology of both male and females.

Materials and methods

All specimens were preserved in 95% alcohol and examined and measured using an ocular calibrated scale bar in a Leica M205C stereomicroscope. Images were captured using an Olympus C7070 wide zoom digital camera mounted on an Olympus SZX12 dissecting microscope or an Olympus BX51 compound microscope. Male and female copulatory organs were removed, cleared in lactic acid, and washed in alcohol for a few minutes. They were then temporarily mounted on glass slides and photographed. Digital images were prepared using Helicon Focus version 6.10 image stacking software and subsequently edited in Adobe Photoshop CC 2020.

Leg lengths are given in the following sequence: femur, patella, tibia, metatarsus, tarsus. Measurements are given in millimeters. Elevation is presented in meters above sea level. Types are deposited in the National Museums of Kenya (NMK), Nairobi, Kenya.

Abbreviations:

AER anterior eye row;
ALE anterior lateral eye;
AME anterior median eye;
AW anterior width;
ATE anterior tegular extension;
d dorsal;
F femur;
MOQ median ocular quadrangle;
Mt metatarsus;
P patella;
PER posterior eye row;
pl prolateral;
PLE posterior lateral eye;
PME posterior median eye;
PTE posterior tegular extension;
PW posterior width;
rl retrolateral;
RTA retrolateral tibial apophysis;
SP spermatheca;
T tibia;
v ventral.

Taxonomy

Family Liocranidae Simon, 1897

Genus *Toxoniella* Warui & Jocqué, 2002

Type species. *Toxoniella taitensis* Warui & Jocqué, 2002 (by original designation).

Toxoniella tharaka Oketch & Li, sp. nov.

http://zoobank.org/501BF871-3C52-4ECE-A0E7-6C6DE695A3AC
Figs 1A–F, 2A, B, 3A–C

Material examined. ***Holotype*** Kenya • ♂; Tharaka Nithi County, Chogoria Town, Mount Kenya National Park, Chogoria Forest (bamboo vegetation); 00.1896°S, 37.4717°E; 2601 m; 20 August 2018; Oketch A.D. & Kioko G. leg. ***Paratypes*** Kenya • 4 ♂, 3 ♀; same data as holotype.

Other material. Kenya • 1 ♂, 4 ♀; Nakuru County, Lake Nakuru National Park, Nganyoi KWS Camp; 00.4903°S, 036.1858°E; 1856 m; 11 August 2018; Kioko G. & Joshua S. leg.

Diagnosis. Males of *Toxoniella tharaka* sp. nov. resemble *T. taitensis* and *T. rogoae* in general appearance but differ from both by having a short, blunt, slightly slanted RTA and a claw-like embolus. The epigyne resembles that of *T. rogoae* by having short cul de sacs but differs by having anteriorly directed cul de sacs (laterally directed in *T. rogoae*) and a wider epigynal groove (closed medially in *T. rogoae*). Additionally, the new species has a medially invaginated anterior epigynal margin instead of a smoothly recurved epigynal margin found in both *T. taitensis* and *T. rogoae* (Fig. 2A, B; Warui and Jocqué 2002, figs 4–6, 11, 12).

Description. Male. Total length 4.59. Carapace 2.60 long, 1.73 wide, yellowish brown with lines of grey setae radiating from fovea. Fovea thin, dark brown, longitudinal. Clypeus about two times the diameter of AME. All eyes have a dark ring around each of them. Eye diameters and interdistances: AME: 0.16, ALE: 0.12, PME: 0.10 and PLE: 0.12, AME–AME: 0.04, AME–ALE: 0.03, MOQ: AW: 0.15, PW: 0.18, Length: 0.18. Chelicerae elongated, brown, reddish orange in some areas. Sternum longer than wide, heart shaped, brown with conspicuous pre-coxal triangles and sparse setae. Labium longer than wide and colored as sternum. Endites longer than wide, about twice the length of labrum. Dorsally, abdomen with grey setae, reddish anteriorly, two pairs of brown sigilla and small brown dots fading towards spinnerets. Venter pale yellowish brown with mottling. Leg measurements: I 7.04 (1.90, 0.85, 1.82, 1.37, 1.10), II 6.06 (1.60, 1.00, 1.40, 1.16, 0.90), III 4.20 (0.68, 0.60, 1.12, 1.10, 0.70), IV 7.14 (1.90, 1.00, 1.50, 1.70, 1.04). Tibiae, metatarsi, and tarsi of anterior leg pairs have long, curved setae (trichobothria) dorsally that increase in length distally. The

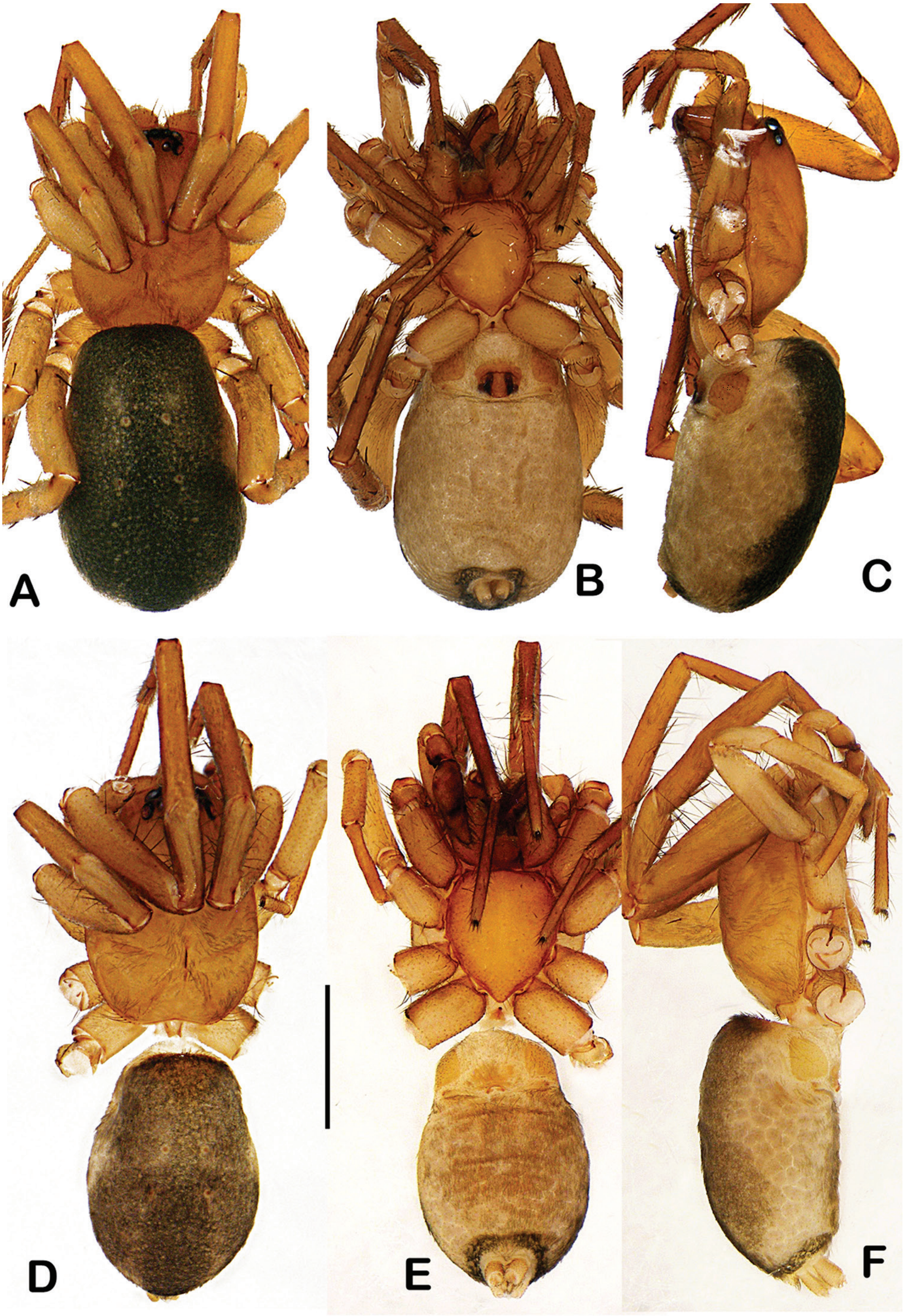

Figure 1. *Toxoniella tharaka* sp. nov., habitus, female paratype (**A–C**) and male holotype (**D–F**) **A, D** dorsal **B, E** ventral **C, F** lateral. Scale bar: 1 mm.

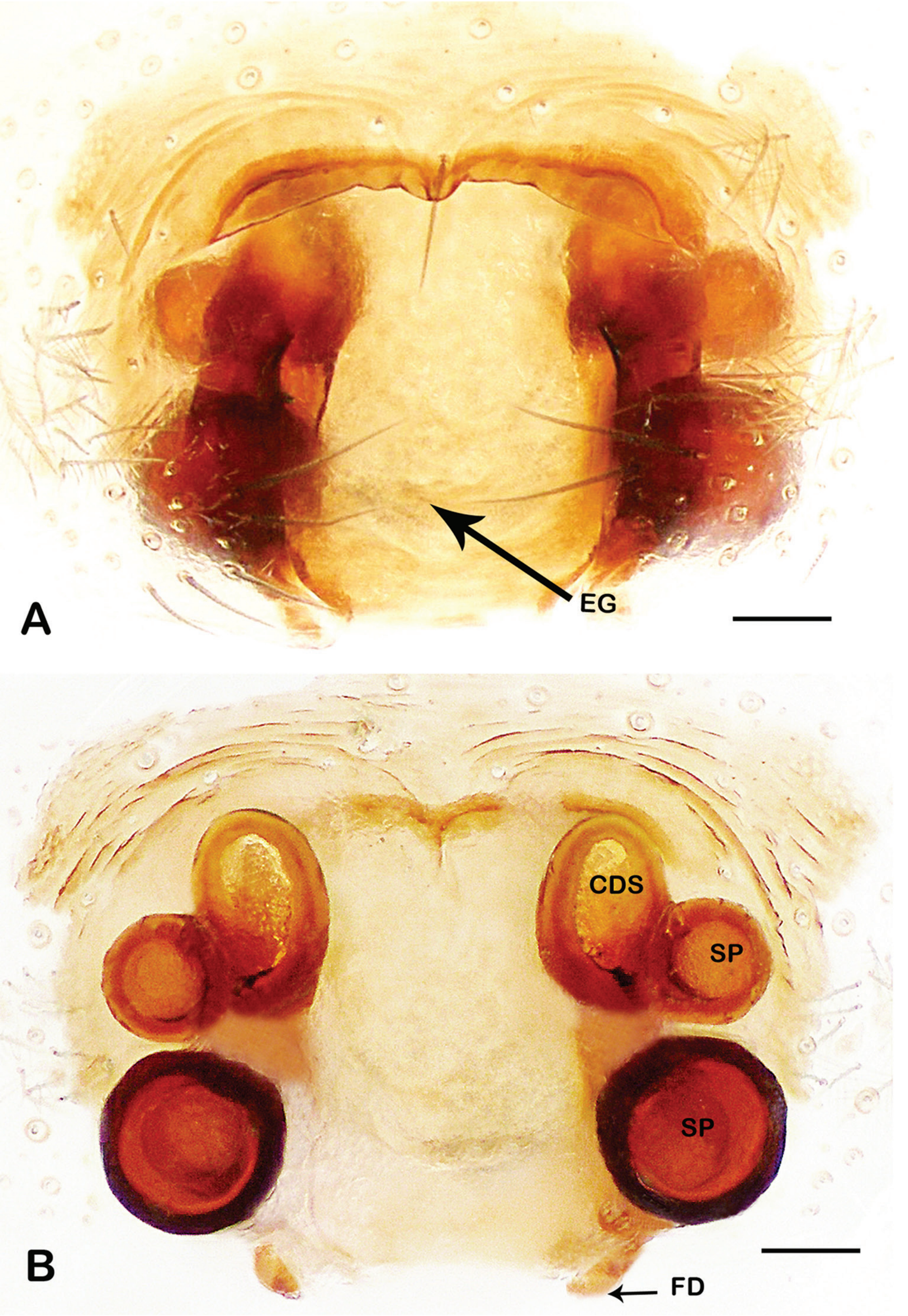

Figure 2. *Toxoniella tharaka* sp. nov., epigyne, female paratype **A** ventral **B** dorsal. Abbreviations: CDS cul de sac, EG epigynal groove, FD fertilization duct, SP spermatheca. Scale bars: 0.25 mm.

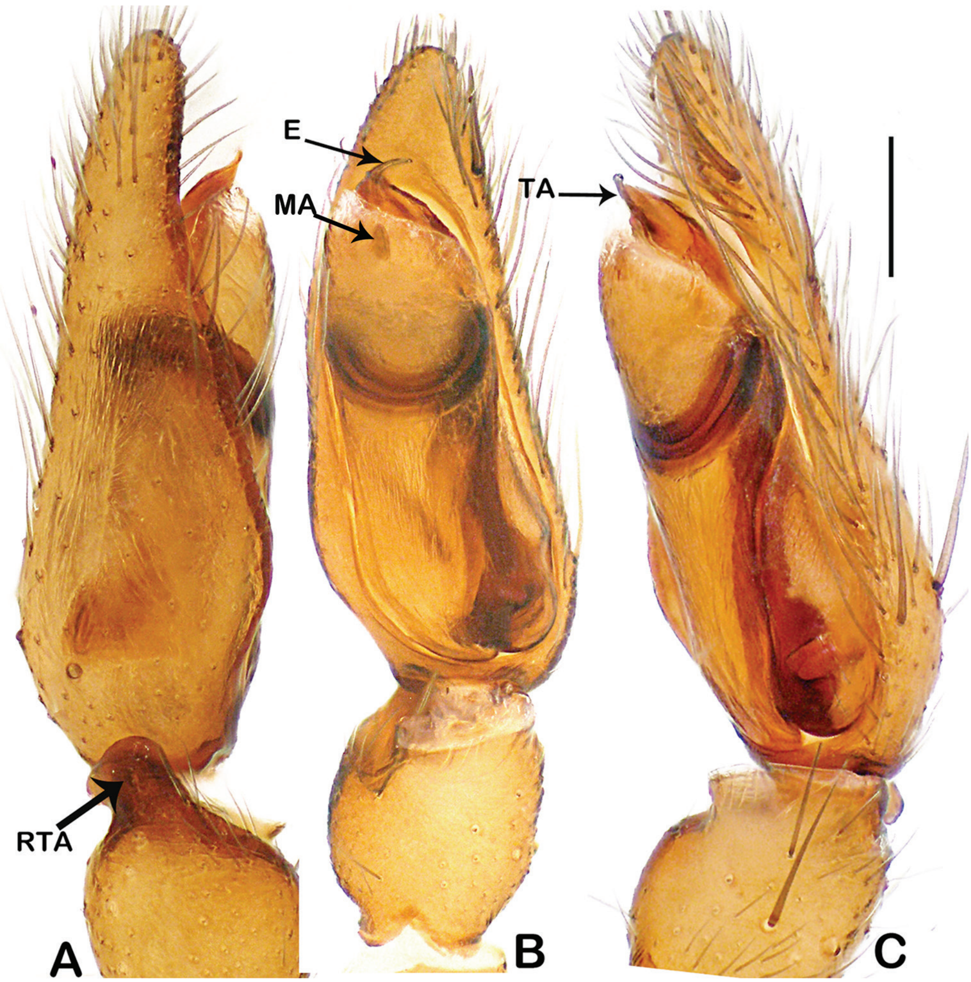

Figure 3. *Toxoniella tharaka* sp. nov., right palp, male holotype **A** dorso-retrolateral showing the RTA **B** ventral **C** prolateral. Abbreviations: E embolus, MA median apophysis, RTA retrolateral tibial apophysis, TA tegular apophysis. Scale bar: 0.25 mm.

tarsi bases have 5–6 pairs of slender tenant setae. Leg spination I: P–T v1–2–2 Mt v2–2–1; II: P–T v1–1–2 Mt v2–2; III: F P–T pl2, d2, rl2, v2–2–1 Mt 11; IV: F pl1, d1, rl1 P v1 T pl2, d1, rl2, v2–2–2. Palp as in Fig. 3A–C. Moderately elongated with blunt, stout, and slightly slanted RTA. Sperm duct U-shaped in ventral view. Embolus claw-like, tegulum apically membranous. Median apophysis small.

Female coloration as in male, with abdomen slightly darker. General body appearance as in Fig. 1A–C. Total length 5.72. Carapace 2.86 long, 1.93 wide between leg pairs II and III, pale yellow-brown, narrow at pars cephalica. Fovea as in male. Eye diameters and interdistances: AME: 0.17, ALE: 0.12, PME: 0.10 and PLE: 0.12, AME–AME: 0.04, AME–ALE: 0.03, MOQ: AW: 0.16, PW: 0.18, Length: 0.18. Chelicerae and sternum as in males. Leg measurements: I 6.40 (1.80, 0.80, 1.60, 1.20, 1.00), II 6.12 (1.40, 0.80, 1.20, 0.92, 0.80), III 4.90 (1.30, 0.60, 0.90, 1.10, 1.00), IV 7.20

(1.80, 0.90, 1.60, 1.80, 1.10). Long, curved setae dorsally on anterior leg pairs, and tenent setae as in males. Leg spination I: P–T v0–2–2 Mt v2–2–2; II: P–T v0–1–2 Mt v2–2; III: F P–T pl2, d2, rl2, v2–2–1 Mt 10; IV: P v1 T pl2, d1, rl2, v2–2–2. Epigyne (Fig. 2A, B) sclerotized, yellowish brown and medially invaginated on the anterior epigynal margin. Median groove wide, separating two pairs of globular spermathecae. Spermathecae outline visible through the epigynal plate. Cul de sacs are short.

Etymology. The species is named after type locality; noun in apposition.

Distribution. Only known from Kenya.

Toxoniella waruii Oketch & Li, sp. nov.

http://zoobank.org/2F7B24BB-4859-40AC-81BD-3376E03C252D

Figs 4A–D, 5A, B, 6A–C

Material examined. ***Holotype*** Kenya • ♂; Nyeri County, Naro Moru Town, Mount Kenya National Park, Naro Moru Gate; 00.1742°S, 37.1162°E; 2465 m; 26 Jul. 2017; Zhao Q. & Kioko G. leg. ***Paratypes*** Kenya • 2 ♂, 3 ♀; same data as holotype.

Diagnosis. Males of *Toxoniella waruii* sp. nov. resemble *T. taitensis* and *T. rogoae* by having a ridge-like RTA but can be distinguished from *T. taitensis* by an apically pointed, posterior tegular extension well-separated from the anterior tegular extension and a bent embolus with a membranous sclerite and from *T. rogoae* by having a flat,

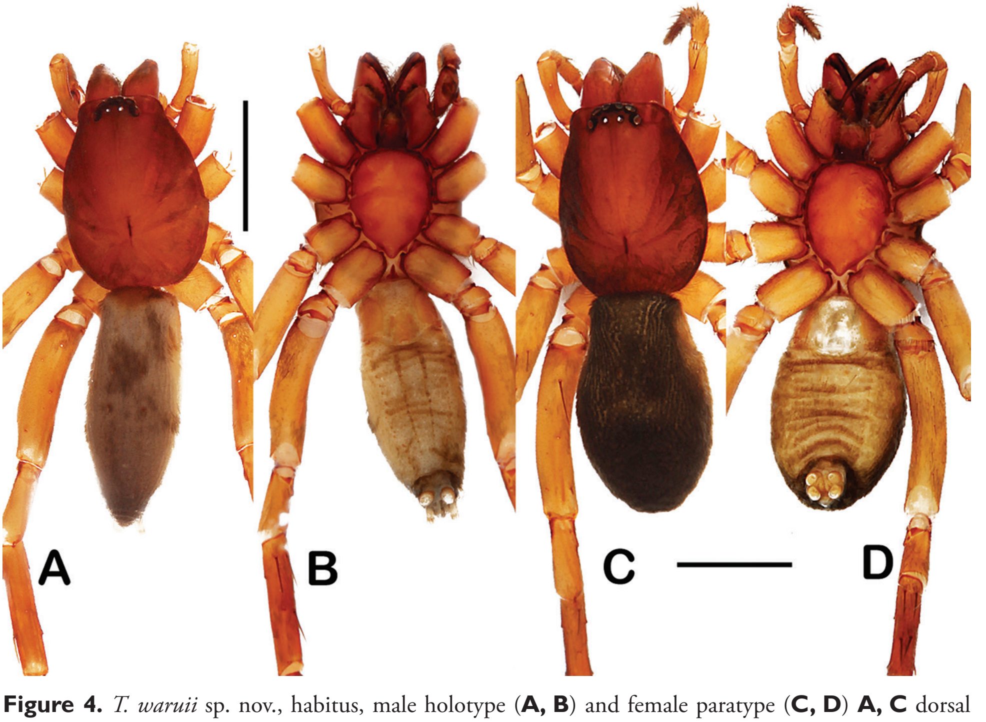

Figure 4. *T. waruii* sp. nov., habitus, male holotype (**A, B**) and female paratype (**C, D**) **A, C** dorsal **B, D** ventral. Scale bars: 1 mm.

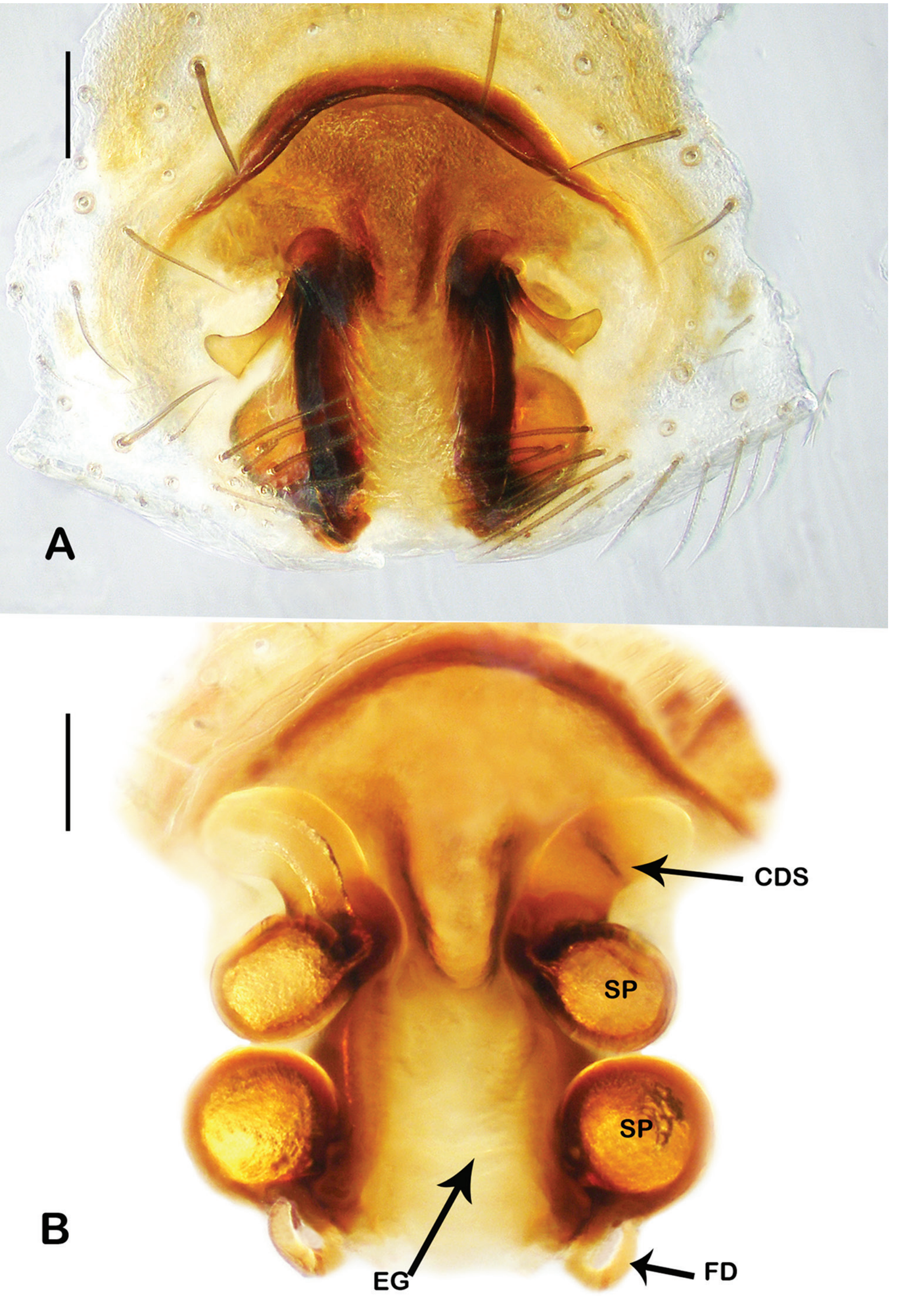

Figure 5. *Toxoniella waruii* sp. nov., epigyne, female paratype **A** ventral **B** dorsal. Abbreviations: CDS cul de sac, EG epigynal groove, FD fertilization duct, SP spermatheca. Scale bars: 0.25 mm.

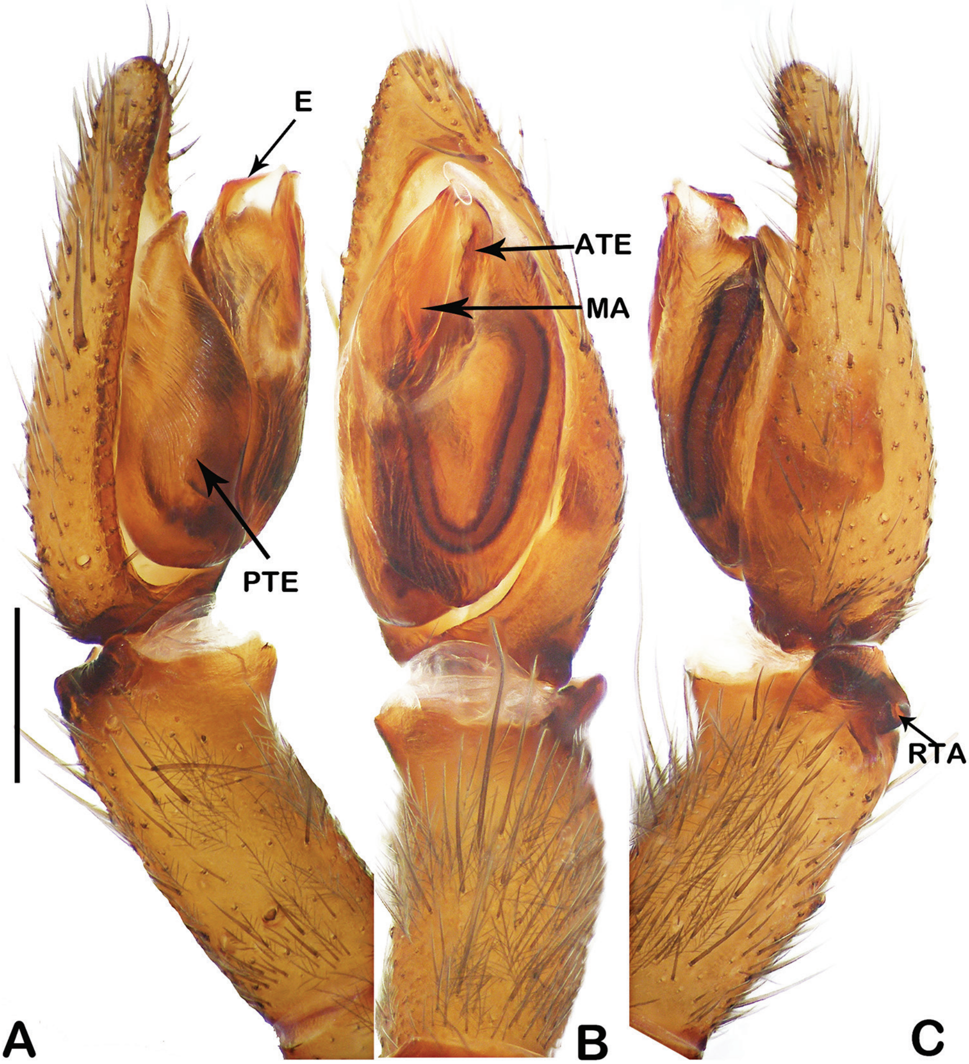

Figure 6. *Toxoniella waruii* sp. nov., left palp, male holotype **A** prolateral **B** ventral **C** retrolateral. Abbreviations: ATE anterior tegular extension, E embolus, MA median apophysis, PTE posterior tegular extension, RTA retrolateral tibial apophysis. Scale bar: 0.25 mm.

distally pointed median apophysis (Fig. 6A–C; Warui and Jocqué 2002: fig. 10). Females of *T. waruii* sp. nov. resemble *T. taitensis* by the fairly elongate epigyne with a wide groove but can be distinguished by a postero-laterally directed pair of anterior spermathecae, cul de sacs do not reach the anterior epigynal margin, and 'bursae' absent (Fig. 5A, B; Warui and Jocqué 2002: figs 7, 8).

Description. Male. Total length 7.20. Carapace 3.40 long, 2.52 wide, brownish orange, narrow at pars cephalica. Setae sparse, grey laterally with grey radiations from fovea. Cephalic area lacks pattern. Clypeus short, chelicerae, endites, and labium colored as carapace. Eye diameters and interdistances: AME 0.16, ALE 0.13, PME 0.09 and PLE: 0.11, AME–AME: 0.04, AME–ALE: 0.03, PME–PME: 0.07, PME–PLE: 0.07, MOQ: AW: 0.13, PW: 0.18, Length: 0.16. Sternum longer than wide, heart shaped, colored as carapace, with strongly pointed post-coxal triangles. Abdomen with dense, grey setae, reddish brown near carapace. Venter pale yellow with two pairs of intermittent lines from epiandrum towards spinnerets. Leg measurements: I 6.57 (1.76, 0.82, 1.58, 1.24, 1.17), II 5.08 (1.30, 0.79, 1.20, 0.90, 0.89), III 4.96 (1.30, 0.60, 0.91, 1.13, 1.02), IV 7.59 (1.80, 0.95, 1.64, 1.86, 1.34). Anterior leg pairs have long curved setae, three on tarsus are longer. Tenent setae in 5–6 pairs. Leg spination I P–T v1–2–2 Mt v2–2–2; II: P–T v0–1–2 Mt v2–2; III: F P–T pl2, d2, rl2, v2–2–1 Mt 8; IV: P v1 T pl2, d1, rl2, v2–2–2. Palp (Fig. 6A–C). RTA a curved ridge, wrench shaped posteriorly (Fig. 6C). Embolus bent, with a membranous, looping sclerite, anterior and posterior tegular extensions distinct. Median apophysis flat and distally pointed (Fig. 6B).

Female. Similar to male in coloration except darker and larger. Total length 7.20. Carapace 3.40 long, 2.20 wide. Eye diameters and interdistances: AME 0.17, ALE 0.13, PME 0.10 and PLE: 0.11, AME–AME: 0.04, AME–ALE: 0.03, PME–PME: 0.07, PME–PLE: 0.07, MOQ: AW: 0.13, PW: 0.18, Length: 0.16. Leg measurements: I 6.61 (1.78, 0.82, 1.58, 1.23, 1.20), II 5.06 (1.30, 0.80, 1.20, 0.90, 0.86), III 4.97 (1.29, 0.60, 0.93, 1.14, 1.01), IV 7.63 (1.80, 0.98, 1.64, 1.87, 1.34). Tenent setae pairs and leg spination as in males. Abdomen grey, wider than in males. Epigyne (Fig. 5A, B). Ventrally sclerotized, brown and dark in some areas. Outline of spermathecae in dorsal view is visible through epigynal plate. Anterior epigynal margin smoothly curves downwards (Fig. 5A). Two pairs of spermathecae, posterior pair larger than anterior pair which are slightly postero-laterally directed. Epigynal groove longer than wide. Cul de sacs about anterior margin of the epigyne.

Etymology. The species name is dedicated to Dr Charles Warui, a Kenyan ecologist who established and described the genus and two species; noun (name) in genitive case.

Distribution. Known only from the type locality.

Toxoniella nyeri **Oketch & Li, sp. nov.**

http://zoobank.org/37EAAA94-42E2-4C29-980B-13AC0616545F

Figs 7A–D, 8A, B, 9A–C

Material examined. ***Holotype*** Kenya • ♂; Nyeri County, Naro Moru Town, Mount Kenya National Park, Naro Moru Gate, Metrological station; 00.1702°S, 37.214°E; 3000 m; 6 Aug. 2018; Kioko G. & Oketch A.D. leg. ***Paratypes*** Kenya • 1 ♂, 3 ♀; same data as holotype.

Diagnosis. Males of *Toxoniella nyeri* sp. nov. can be distinguished from other congeners by the talon-like RTA, the large, pointed embolus, and the apically membranous median apophysis (Fig. 9A–C). Females are similar to other members of this genus by having two pairs of spermathecae, with the posterior pair larger than the

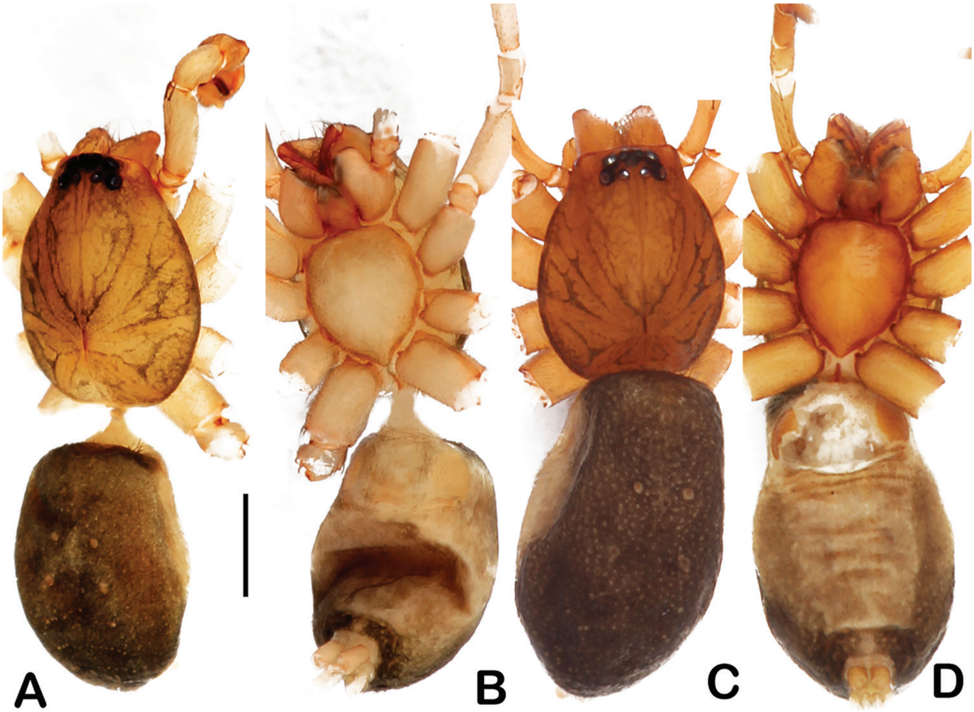

Figure 7. *Toxoniella nyeri* sp. nov., habitus, male holotype (**A, B**) and female paratype (**C, D**) **A, C** dorsal **B, D** ventral. Scale bar: 1 mm.

anterior pair. However, they can be differentiated from the other species as the cul de sacs are longer in *T. nyeri* sp. nov. than in *T. waruii* sp. nov. and *T. tharaka* sp. nov. In addition, *T. nyeri* sp. nov. have a patterned carapace that forms a Ψ-shape with the fovea in both males and females (Fig. 7A, C).

Description. Male. Total length 6.83. Carapace 3.20 long, 2.34 wide, orangish brown with dark net-like pattern; with two dark lines towards either of the posterior median eyes. Fovea dark brown. Clypeus vertical and short, yellowish brown, as are chelicerae. Eye diameters and interdistances AME: 0.15, ALE: 0.12, PME: 0.13, PLE: 0.13, AME–AME: 0.05, AME–ALE: 0.04, PME–PME: 0.12, PME–PLE: 0.11, MOQ: AW: 0.26, PW: 0.34, Length: 0.27. All eyes have dark pigment around them. Sternum pale yellow, heart shaped, longer than wide. Precoxal triangle weakly pointed. Labium longer than wide, approximately twice the length of endites. Abdomen dorsally grey with thick, short setae. Venter greyish. Leg measurements: I 6.42 (1.70, 0.73, 1.59, 1.20, 1.20), II 5.10 (1.30, 0.75, 1.27, 0.87, 0.91), III 4.97 (1.32, 0.66, 0.90, 1.10, 0.99), IV 7.49 (1.76, 0.91, 1.64, 1.81, 1.37). Anterior leg pairs have long, curved setae. Tenent setae in 5–6 pairs. Leg spination; most of the spines have been detached; III: P–T pl2, d2, rl2, v2–2–2 Mt 10; IV: P v1 T pl2, d1, rl2, v2–2–2. Palp (Fig. 9A–C), RTA ridged; dorsal talon-like; ventral blunt, mound-like. Embolus large, curving, originating at 9 o'clock

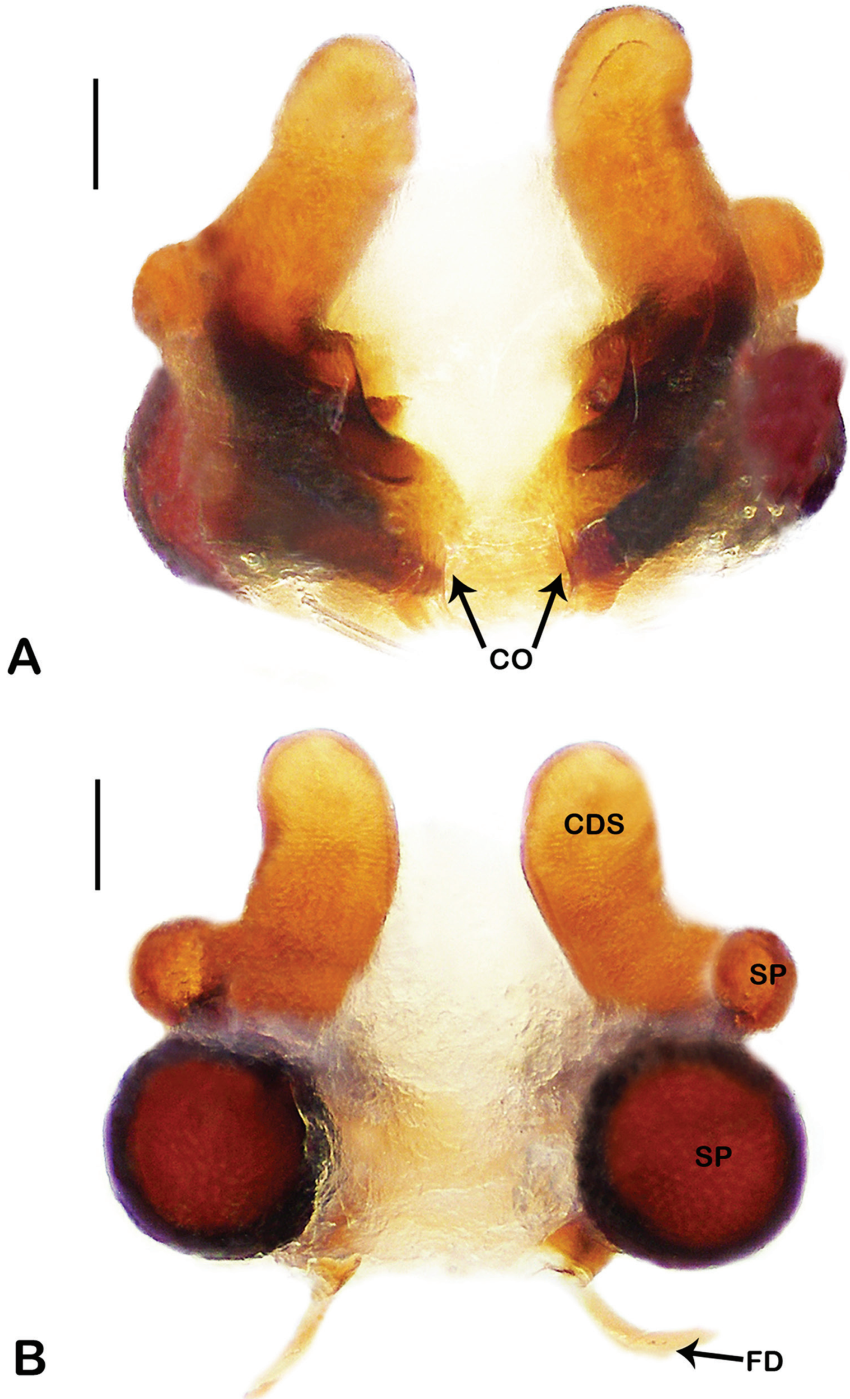

Figure 8. *Toxoniella nyeri* sp. nov., epigyne, female paratype **A** ventral **B** dorsal. Abbreviations: CDS cul de sac, CO copulatory opening, FD fertilization duct (interfered with during manipulation), SP spermatheca. Scale bars: 0.25 mm.

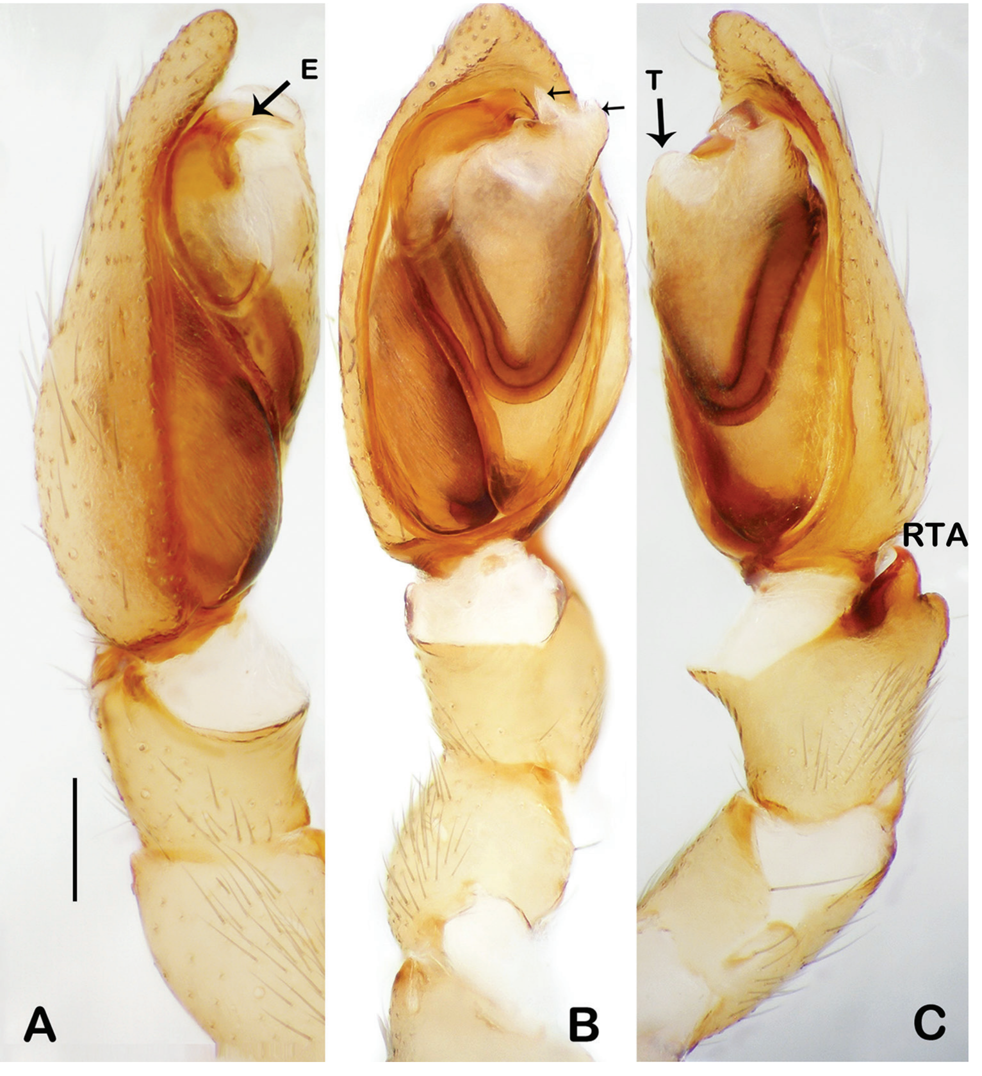

Figure 9. *Toxoniella nyeri* sp. nov., left palp, male holotype **A** prolateral **B** ventral **C** retrolateral. Abbreviations: E embolus, RTA retrolateral tibial apophysis, T tegulum. Scale bar: 0.25 mm.

position. Membranous median apophysis obscuring some parts of embolus in retrolateral view. Sperm duct forms a V-shape.

Female. Slightly larger and darker than male. Total length 6.90. Carapace length 3.41, width 2.59, color and pattern as in male. Eye diameters and interdistances AME: 0.15, ALE: 0.12, PME: 0.13, PLE: 0.12, AME–AME: 0.05, AME–ALE: 0.04, PME–PME: 0.13, PME–PLE: 0.12, MOQ: AW: 0.26, PW: 0.34, Length: 0.27. Sternum pale brown. Pre-coxal triangles as in male. Leg measurements: I 6.36 (1.70, 0.71, 1.59, 1.20, 1.16), II 5.10 (1.30, 0.75, 1.27, 0.87, 0.91), III 4.98 (1.32, 0.66, 0.90, 1.10, 1.00), IV 7.46 (1.74, 0.91, 1.64, 1.80, 1.37). Tarsal tenent setae as in males. Leg spination III:

P–T pl2, d1, rl2, v2–2–2 Mt 11; IV: P v1 T pl2, d1, rl2, v2–2–2. Epigyne (Fig. 8A, B) dark reddish brown and strongly sclerotized. Copulatory openings small, relatively close together. Cul de sacs quite elongated, anterior spermathecae very small, approximately three times the diameter of the posterior pair. Epigynal groove wide.

Etymology. The species is named after type locality; noun in apposition.

Distribution. Known only from the type locality.

Acknowledgements

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RESEARCH ARTICLE

African Invertebrates
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Identity of parasitoid wasps (Hymenoptera, Braconidae and Eulophidae) reared from aquatic leaf-mining flies (Diptera, Ephydridae) on invasive Brazilian waterweed *Egeria densa* in South Africa

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Abstract

The Brazilian waterweed, *Egeria densa* Planchon, 1849 (Hydrocharitaceae), is an invasive species in South Africa where it is a host plant for the aquatic leaf-miner *Hydrellia egeriae* Rodrigues-Júnior, 2015 (Ephydridae, Diptera). Efficacy of the biocontrol agent can potentially be affected by parasitoids. Three species of braconid parasitoid wasps were reared from puparia of *Hydrellia egeriae*. By comparison with the type specimens, these species have been determined to be *Ademon lagarosiphonae* van Achterberg, 2012 (Braconidae: Opiinae), *Chaenusa anervata* van Achterberg, 2012 and *Chaenusa seminervata* van Achterberg, 2012 (Braconidae: Alysiinae: Dacnusini), all previously recorded as parasitoids of an ephydrid dipterous aquatic leaf-miner, *Hydrellia lagarosiphon* Deeming, 2012, on *Lagarosiphon major* (Ridley, 1886) Moss ex Wager (Hydrocharitaceae) in South Africa. The chalcidoid, *Janicharis africanus* Gumovsky & Delvare, 2006 (Eulophidae), was also reared from *Hydrellia egeriae* and is possibly a hyperparasitoid of the braconids. South Africa is a new country record for *J. africanus*. We provide comprehensive images of all species including the braconid types and illustrated identification keys to the Afrotropical species of the two braconid genera are also provided. All images and online keys are available on WaspWeb (http://www.waspweb.org).

Keywords
Ademon, Alysiinae, aquatic weeds, biocontrol, *Chaenusa*, Entedoninae, *Hydrellia egeriae*, Hydrocharitaceae, *Janicharis*, Opiinae

Introduction

Egeria densa Planchon, 1849, Hydrocharitaceae (Brazilian waterweed; also known as leafy elodea or dense waterweed) is a rooted submerged aquatic macrophyte native to Brazil, Argentina and Uruguay (Cook and Urmi-König 1984; Cabrera Walsh et al. 2013). Stems are elongate, with a diameter of between 1 and 3 mm and irregular side branching (Cook and Urmi-König 1984). It prefers still to slow-moving water and can grow until it reaches the water surface (Yarrow et al. 2009). Leaves are small (10 to 44 mm long, 1.5 to 4.5 mm wide) and are characteristically grouped as four leaves per whorl (Cook and Urmi-König 1984). Vegetative growth occurs at double nodes on stems, which can either produce flowers, lateral branches or root buds (Yarrow et al. 2009). *Egeria densa* has been distributed around the world because it is an "oxygenator" and has a simple anatomy, making it an ideal aquarium and study plant (Yarrow et al. 2009; Coetzee et al. 2011a; June-Wells et al. 2012). Due to its ability to grow from fragments, it has established and become invasive in many countries (Hussner et al. 2017). In South Africa, it has taken advantage of open, eutrophic water following the successful management of floating aquatic weeds (Coetzee et al. 2011a). *Egeria densa* grows vigorously in eutrophic systems, which allows it to form dense uniform stands, with negative ecological, economic and societal impacts on the invaded system (Vundla et al. 2017; Smith et al. 2019).

A biocontrol investigation, conducted by the Centre for Biological Control at Rhodes University (South Africa) on the invasive Brazilian waterweed, produced four species of parasitoid wasps belonging to two families. These were reared from puparia of the ephydrid fly, *Hydrellia egeriae* Rodrigues-Júnior, 2015, a phytophagous biological control agent attacking *Egeria densa*. The Ephydridae contain a number of important naturally-occurring biological control agents of submerged invasive waterweeds (Wheeler and Center 2001; Baars et al. 2010; Coetzee et al. 2011a, b; Cabrera Walsh et al. 2013; Bownes 2014). These flies are attacked by braconid parasitoid wasps mainly belonging to the genera *Ademon* Haliday, 1833 and *Opius* Wesmael, 1835 (subfamily Opiinae); and *Chaenusa* Haliday, 1839 and *Chorebus* Haliday, 1833 (tribe Dacnusini, subfamily Alysiinae) (Yu et al. 2016). Both *Ademon* and *Chaenusa* contain aquatic parasitoid species of *Hydrellia* Robineau-Desvoidy, 1830 flies (Diptera, Ephydridae) (Kula and Zolnerowich 2008; van Achterberg and Prinsloo 2012; Kula and Harms 2016). We here provide determinations and photographs of the four species of parasitoid wasps recorded from puparia of the aquatic leaf-miner, *Hydrellia egeriae* developing on Brazilian waterweed *Egeria densa* to facilitate ongoing investigation into the efficacy of *Hydrellia egeriae* as a biocontrol agent in South Africa. We also provide illustrated identification keys to the species of the two braconid genera occurring in Africa.

Materials and methods

Photography

Images were acquired at SAMC with a Leica LAS 4.9 imaging system, comprising a Leica Z16 microscope with a Leica DFC450 Camera and 0.63× video objective attached. The imaging process, using an automated Z-stepper, was managed using the Leica Application Suite V. 4.9 software installed on a desktop computer. Diffused lighting was achieved using a Leica LED 5000 Dome.

Depositories

CASC California Academy of Sciences, San Francisco, USA (Curator: Brian Fisher);
CIRAD Centre de Coopération Internationale en Recherche Agronomique pour le Développement (Curator: Philippe Lachenaud);
MNHN Muséum national d'Histoire naturelle, Paris (Curator: Bernardo Santos);
NHMUK Natural History Museum, London (Curator: Gavin Broad);
RMNH Naturalis Biodiversity Center, Leiden (Curator: Luc Willemse);
SAMC Iziko South African Museum, Cape Town, South Africa (Curator: Simon van Noort);
SANC National Collection of Insects, ARC, Pretoria (Curator: Vivienne Uys).

Results

Four parasitoid wasp species belonging to two families (Braconidae and Eulophidae) were reared from puparia of *Hydrellia egeriae* on *Egeria densa*. The three braconids, through comparison with the type specimens, were determined to be *Ademon lagarosiphonae* van Achterberg, 2012 (Opiinae), *Chaenusa anervata* van Achterberg, 2012 and *Chaenusa seminervata* van Achterberg, 2012 (Alysiinae), described from specimens reared from an aquatic ephydrid leafminer, *Hydrellia lagarosiphon* Deeming, 2012 on *Lagarosiphon major*, (Ridley, 1886) Moss ex Wager also of the family Hydrocharitaceae. The chalcidoid, *Janicharis africanus* Gumovsky & Delvare, 2006 (Eulophidae) was also reared from this ephydrid fly and is likely a hyper-parasitoid of the braconids.

All images included in this paper, as well as additional images and online interactive keys to the braconid species are available on WaspWeb (http://www.waspweb.org) (van Noort 2021):
http://www.waspweb.org/Ichneumonoidea/Braconidae/Alysiinae/index.htm
http://www.waspweb.org/Ichneumonoidea/Braconidae/Opiinae/index.htm
http://www.waspweb.org/Ichneumonoidea/Braconidae/Keys/index.htm
http://www.waspweb.org/Chalcidoidea/Eulophidae/Entedoninae/Janicharis/index.htm

Family Braconidae

Subfamily Alysiinae Leach, 1815
Tribe Dacnusini Foerster, 1862

Genus *Chaenusa* Haliday, 1839

Alysia (*Chaenusa*) Haliday, 1839: 19. Type species: *Bracon conjungens* Nees von Esenbeck, 1812 (1811), by monotypy; type destroyed.

Chorebidea Viereck, 1914: 32. Type species: *Alysia* (*Chorebus*) *nereidum* Haliday, 1839, by original designation and monotypy. Treated as *Chaenusa* (*Chorebidea*) Viereck, 1914 (Zaykov 1986).

Chorebidea Nixon, 1943: 28. Preoccupied. Type species: *Alysia* (*Chorebus*) *naiadum* Haliday, 1839, by original designation and monotypy.

Chorebidella Riegel, 1950: 125. Type species: *Chorebidella bergi* Riegel, 1950, by original designation and monotypy.

Diagnosis. See Kula and Zolnerowich 2008.

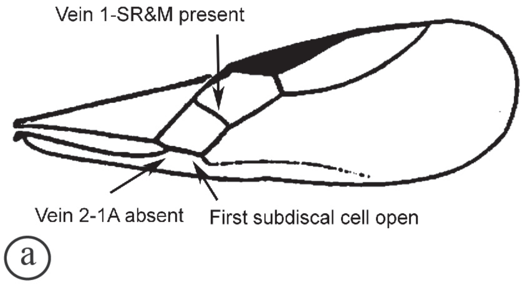
Distribution. Afrotropical, Australian, Nearctic, Neotropical, Oriental and Palaearctic Regions (Kula and Zolnerowich 2008; Yu et al. 2016).

Key to the Afrotropical species of the genus *Chaenusa* Haliday

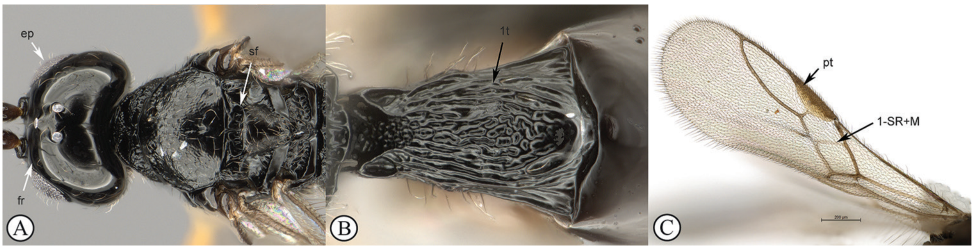
Modified after van Achterberg and Prinsloo 2012.

1 Vein 2–1A of forewing completely developed, resulting in a closed first subdiscal cell (A); vein 1-SR+M of forewing absent or, when present, largely unsclerotised (A); apical half of metasoma of female largely depressed (B); body black; face strongly narrowed in females, ventrally narrower than high (C) (subgenus *Chaenusa* Haliday, 1839)..**2**

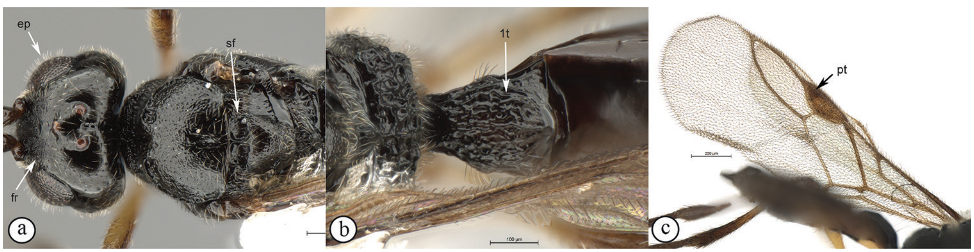
– Vein 2–1A of forewing largely absent, resulting in an open first subdiscal cell (a); vein 1-SR+M of forewing sclerotised, complete (a); apical half of metasoma of female strongly compressed; body largely reddish-brown; female face slightly wider than high (subgenus *Chorebidea* Viereck, 1914) .... ***Chaenusa testacea***



2 Frons (fr) and face polished (A); face and eyes (ep) sparsely pubescent (A); each scutellar fovea (sf) with 2 or 3 longitudinal septa (A); first tergite (1t) longer than posteriorly wide, laterally strigous, medially rugulose (B); vein 1-SR+M of forewing pigmented, but largely unsclerotised (C); distal end of pterostigma (pt) comparatively elongate (C) .... ***Chaenusa seminervata***



– Frons (fr) and face granulate (a); face and eyes (ep) densely pubescent (a); each scutellar fovea (sf) with no obvious longitudinal septa (a); first tergite (1t) as long as posteriorly wide, overall rugulose without longitudinal strigae (b); vein 1-SR+M of forewing absent (c); distal end of pterostigma (pt) comparatively shorter and more robust (c)........................... ***Chaenusa anervata***



***Chaenusa* (*Chaenusa*) *anervata* van Achterberg, 2012**
Figs 1–4

Holotype. South Africa • female; Mpumalanga Prov., Lydenburg Fisheries, Lydenburg; 25°11'S, 30°48'E; 21.xi.2008; J.R. Baars, J.A. Coetzee, G.D. Martin; ex leafminer on *Lagarosiphon major* Hydrocharitaceae (SANC examined).

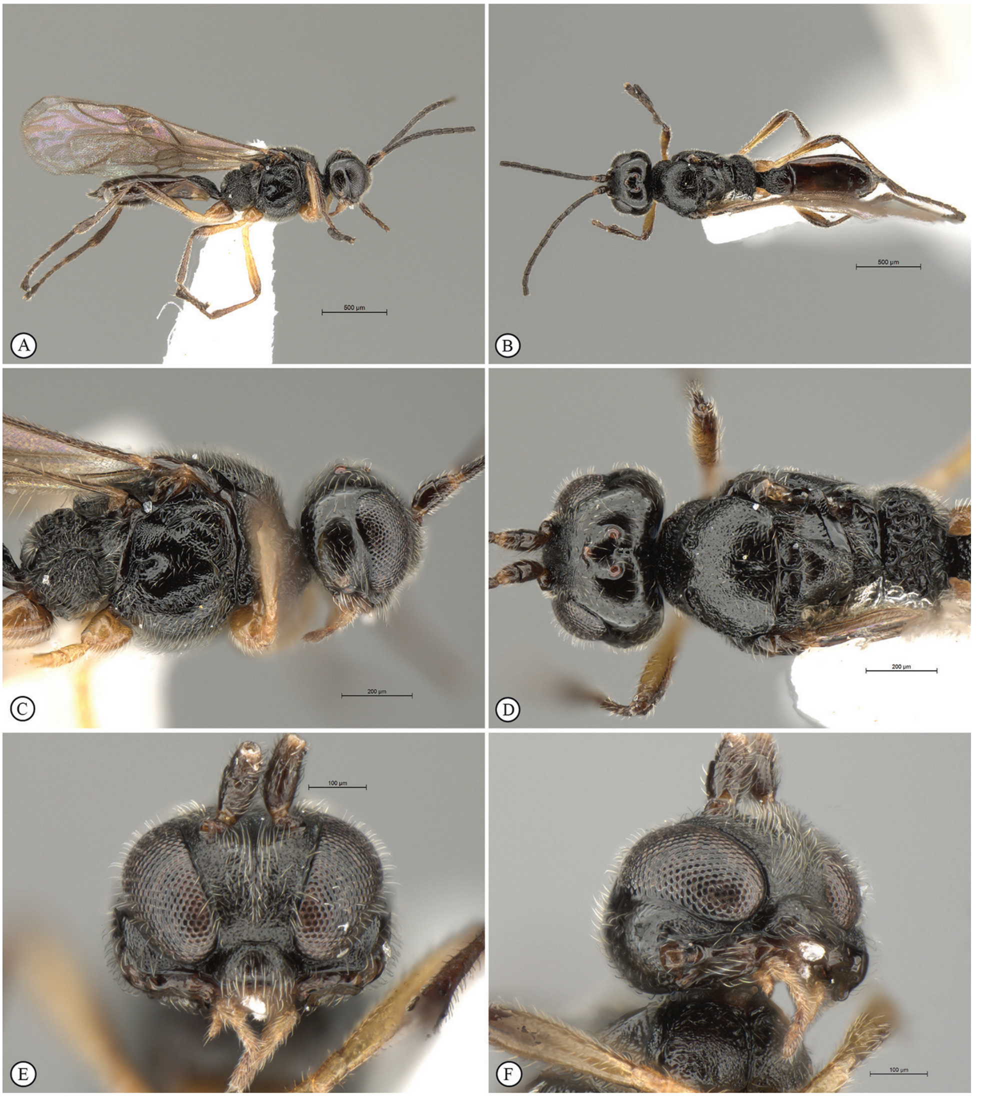


Figure 1. *Chaenusa anervata* Holotype female TYPH01927 (SANC) **A** habitus, lateral view **B** habitus, dorsal view **C** head and mesosoma, lateral view **D** head and mesosoma, dorsal view **E** head, anterior view **F** head, ventrolateral view.

Paratypes. South Africa • 1 female; KwaZulu-Natal Prov., Mooi River, Mearns Dam; 29°25'S, 29°97'E; 18.xi.2008; J.R. Baars, J.A. Coetzee, G.D. Martin; ex leaf-miner on *Lagarosiphon major* Hydrocharitaceae (RMNH not seen) • 1 male: Underberg, Farm Dam on Bushman's Nek road; 30°27'S, 29°14'E; 16.xi.2008 (SANC examined) • 1 male; Mooi River, Mearns Weir, 29°15'S, 29°57'E, 17.xi.2008 (RMNH not seen).

Figure 2. *Chaenusa anervata* Holotype female TYPH01927 (SANC) **A** propodeum and metasoma, dorsal view **B** propodeum and metasoma, lateral view **C** scutellum, metanotum and propodeum, dorsal view **D** first tergite, dorsal view **E** wings **F** data labels.

Other material. South Africa • 1 male; *KwaZulu-Natal*, Midmar Dam, 29°32'21.35"S, 30°11'40.15"E, June 2019, R. Smith, Collected from *Egeria densa* infestation with *Hydrellia egeriae* pupae, reared in lab, MDMR-FOR-R05, SAM-HYM-P092803 (SAMC).

Biology. Parasitoid of aquatic leaf-mining flies (Ephydridae): *Hydrellia lagarosiphon* on *Lagarosiphon major* (Hydrocharitaceae) and *Hydrellia egeriae* on *Egeria densa* (Hydrocharitaceae).

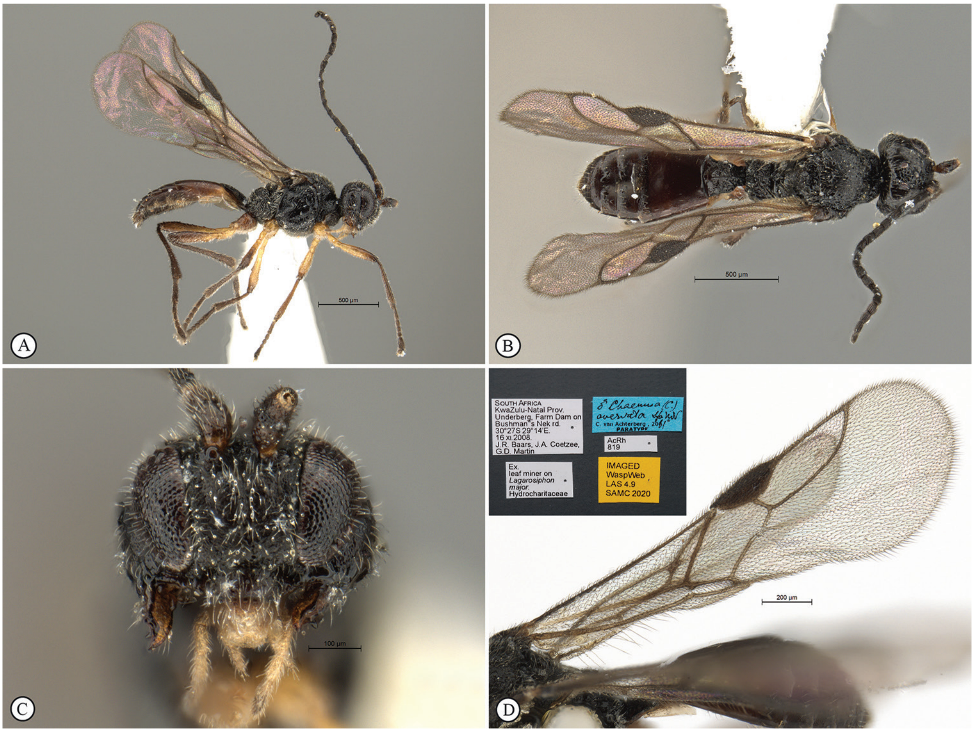


Figure 3. *Chaenusa anervata* Paratype male (SANC) **A** habitus, lateral view **B** habitus, dorsal view **C** head, anterior view **D** wings, inset: data labels.

Distribution. South Africa.

Comments. According to van Achterberg and Prinsloo (2012), this species is similar to *Chaenusa glabra* Kula, 2009 (India, Pakistan), which has a two-segmented labial palp (three-segmented in *C. anervata* and *C. seminervata*), females with 12–14 antennal segments (at least 15 in *C. anervata* and 16–18 in *C. seminervata*) and males with 14–17 segments (22 in *C. anervata* and 17–24 in *C. seminervata*). The body is brown or brownish-yellow as opposed to black in *C. anervata* and *C. seminervata* (van Achterberg and Prinsloo 2012). Other sexually dimorphic characters in *C. anervata* encompass the forewing pterostigma, which is light brown in females and dark brown in males; the male first metasomal tergite is generally longer (1.1–1.3 times its apical width) than in the female (1.1 times apical width) (van Achterberg and Prinsloo 2012); in addition, the compound eyes in females converge far more strongly (narrowest ventral width of face 0.55× broadest dorsal width) towards the clypeus than in the males (narrowest ventral width of face 0.90× broadest dorsal width); however, the overall relative dimensions of the face relative to the broadest width just below the toruli are equivalent in the two sexes, being slightly wider than high (females H:W = 9:10; males H:W = 10:11).

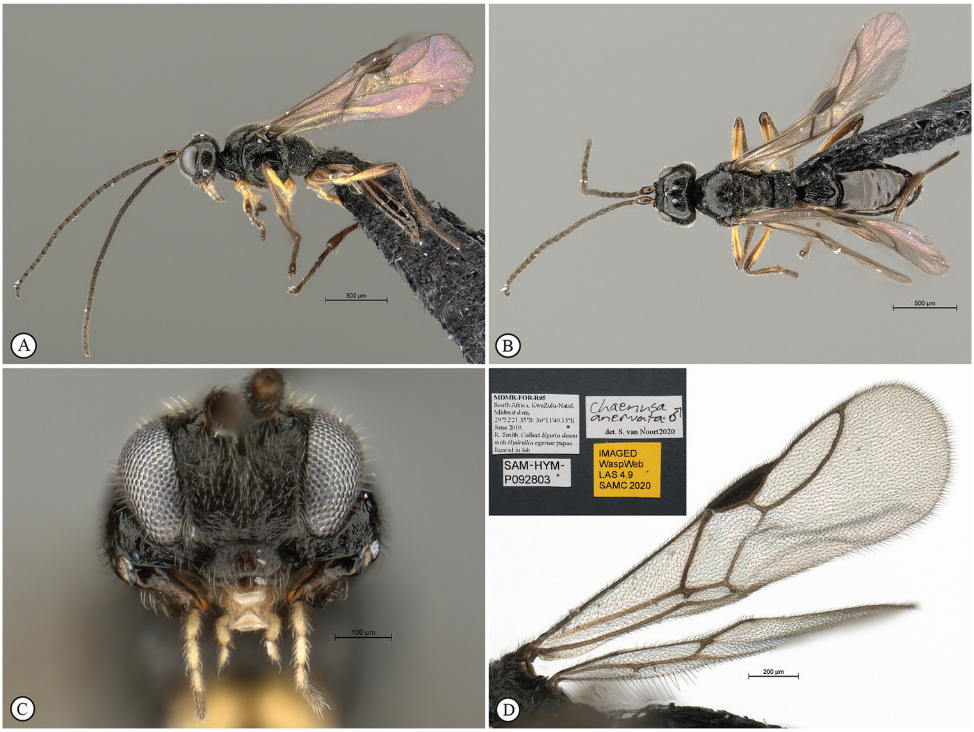


Figure 4. *Chaenusa anervata* male SAM-HYM-P092803 (SAMC) **A** habitus, lateral view **B** habitus, dorsal view **C** head, anterior view **D** wings, inset: data labels.

***Chaenusa* (*Chaenusa*) *seminervata* van Achterberg, 2012**
Figs 5–9

Holotype. South Africa • female; Mpumalanga Prov., Lydenburg Fisheries, Lydenburg; 25°11'S, 30°48'E; 21.xi.2008; J.R. Baars, J.A. Coetzee, G.D. Martin; ex leaf-miner on *Lagarosiphon major* Hydrocharitaceae (SANC examined).

Paratypes. South Africa • 1 female; Mpumalanga Prov., Belfast, Lakenvlei Wetland; 25°60'S, 30°05'E (RMNH not seen) • 1 male; KwaZulu-Natal Prov., Stillwater Dam, Rosetta; 29°30'S, 29°97'E; 17.xi.2008; J.R. Baars, J.A. Coetzee, G.D. Martin; ex leaf-miner on *Lagarosiphon major* Hydrocharitaceae (RMNH not seen) • 4 males; Dieu Donne Farm Dam, Sani Pass; 29°68'407"S, 29°48'949"E; 16.xi.2008; J.R. Baars, J.A. Coetzee, G.D. Martin; reared from leaf-miner on *Lagarosiphon major* (Hydrocharitaceae) (SANC examined, RMNH not seen).

Other material. South Africa • 1 male; *KwaZulu-Natal*, Midmar Dam, 29°32'21.35"S, 30°11'40.15"E, June 2019, R. Smith, collected from *Egeria densa* infestation with *Hydrellia egeriae* pupae, reared in lab, MDMR-FOR-R01, SAM-HYM-P092800 (SAMC) • 1 female, idem, except MDMR-FOR-R02, SAM-HYM-P092801

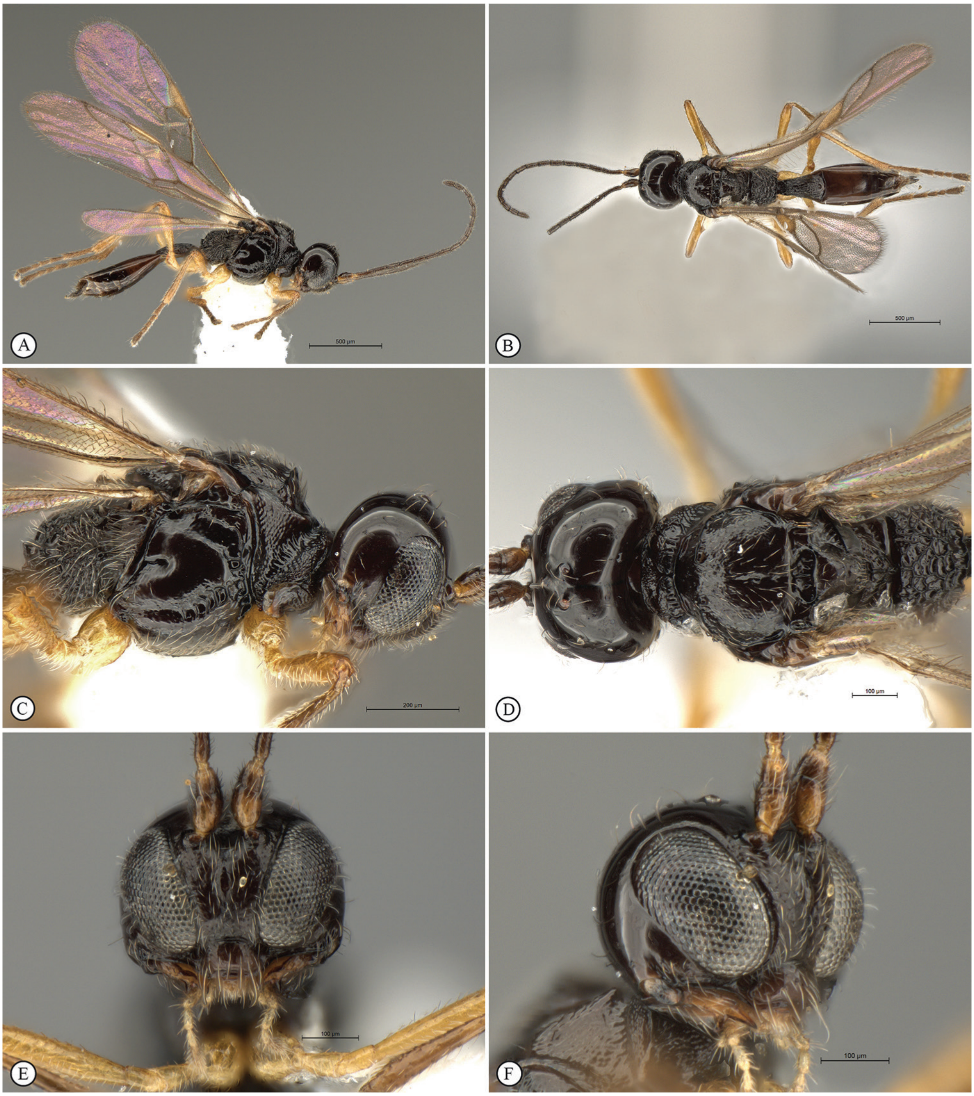


Figure 5. *Chaenusa seminervata* Holotype female TYPH01928 (SANC) **A** habitus, lateral view **B** habitus, dorsal view **C** head and mesosoma, lateral view **D** head and mesosoma, dorsal view **E** head, anterior view **F** head, ventrolateral view.

(SAMC) • 1 male, idem, except MDMR-FOR-R04, SAM-HYM-P092802 (SAMC) • 1 male, idem, except MDMR-FOR-R09, SAM-HYM-P092804 (SAMC) • 1 male, idem, except MDMR-FOR-R10, SAM-HYM-P092805 (SAMC) • 1 male, idem, except MDMR-FOR-R14, SAM-HYM-P092806 (SAMC).

Biology. Parasitoid of aquatic leaf-mining flies (Ephydridae): *Hydrellia lagarosiphon* on *Lagarosiphon major* (Hydrocharitaceae) and *Hydrellia egeriae* on *Egeria densa* (Hydrocharitaceae).

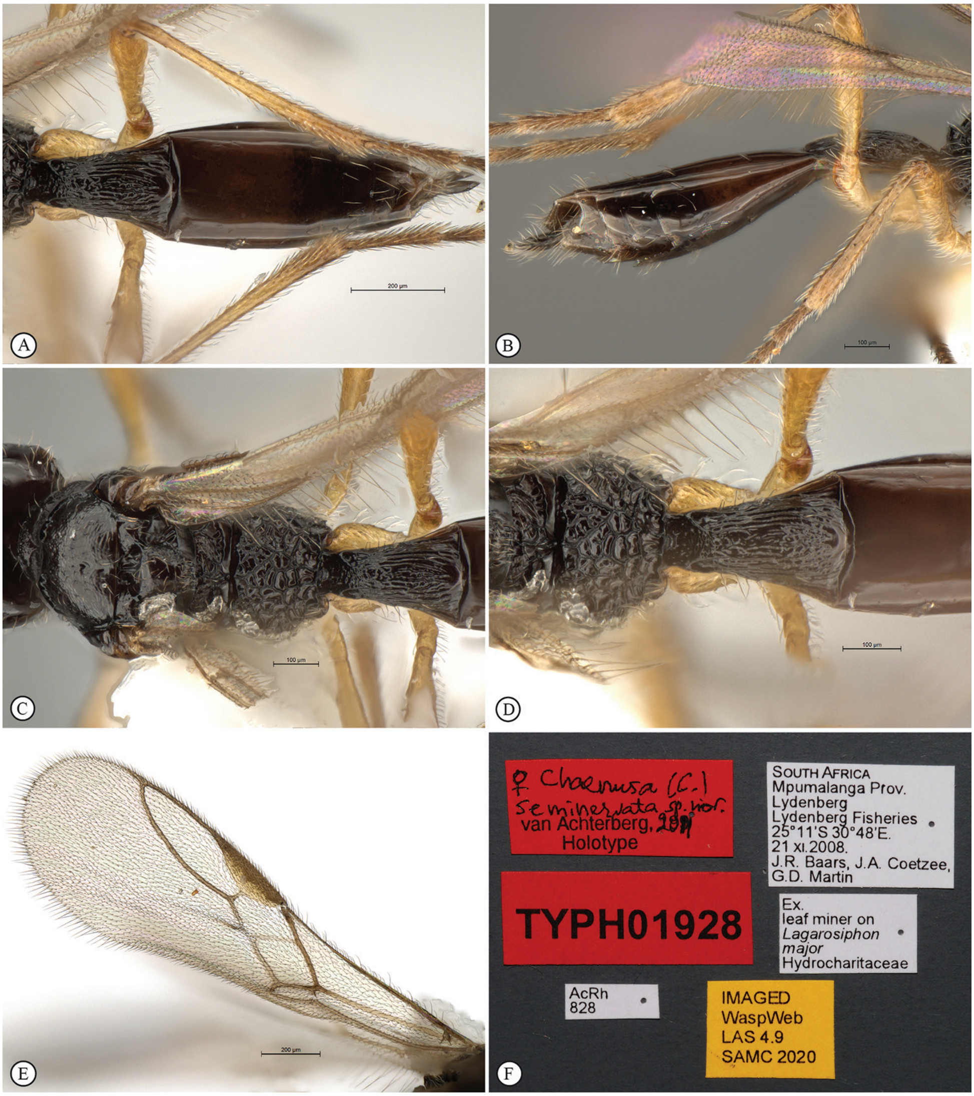


Figure 6. *Chaenusa seminervata* Holotype female TYPH01928 (SANC) **A** propodeum and metasoma, dorsal view **B** propodeum and metasoma, lateral view **C** mesosoma and first tergite, dorsal view **D** propodeum and first tergite, dorsal view **E** wings **F** data labels.

Distribution. South Africa.

Comments. The Neotropical species *Chaenusa aurantium* Kula & Martinez, 2009 was reared from an undescribed species of *Hydrellia* in Argentina under evaluation for control of *Egeria densa* in the United States (Kula et al. 2009). *Chaenusa seminervata* keys to *C. aurantium* (terminal maxillary palpomere is brown) in the key to New World species (Kula and Zolnerowich 2008; Kula et al. 2009), but it is distinct from *C. aurantium* in head colour, sculpture and setation of the frons, as well as

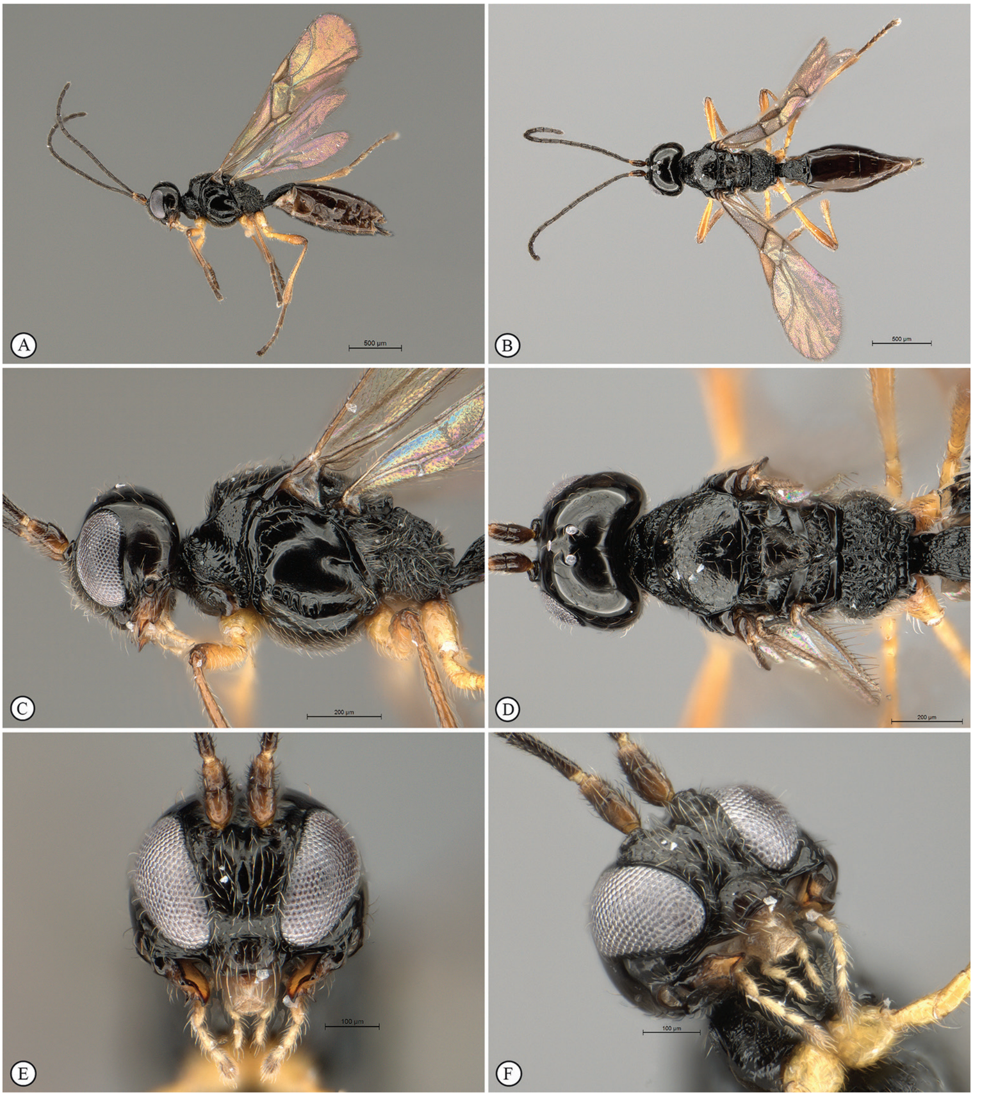


Figure 7. *Chaenusa seminervata* female SAM-HYM-P092801 (SAMC) **A** habitus, lateral view **B** habitus, dorsal view **C** head and mesosoma, lateral view **D** head and mesosoma, dorsal view **E** head, anterior view **F** head, ventrolateral view.

mesoscutal, mesopleural and propodeal sculpture. Sexual dimorphism of *Chaenusa seminervata* is exhibited in the following characters: females with 16–18 antennal segments, males with 17–24 segments; the forewing pterostigma is light brown in females and dark brown in males; in addition, the compound eyes in females converge less strongly (narrowest ventral width of the face 0.75× broadest dorsal width)

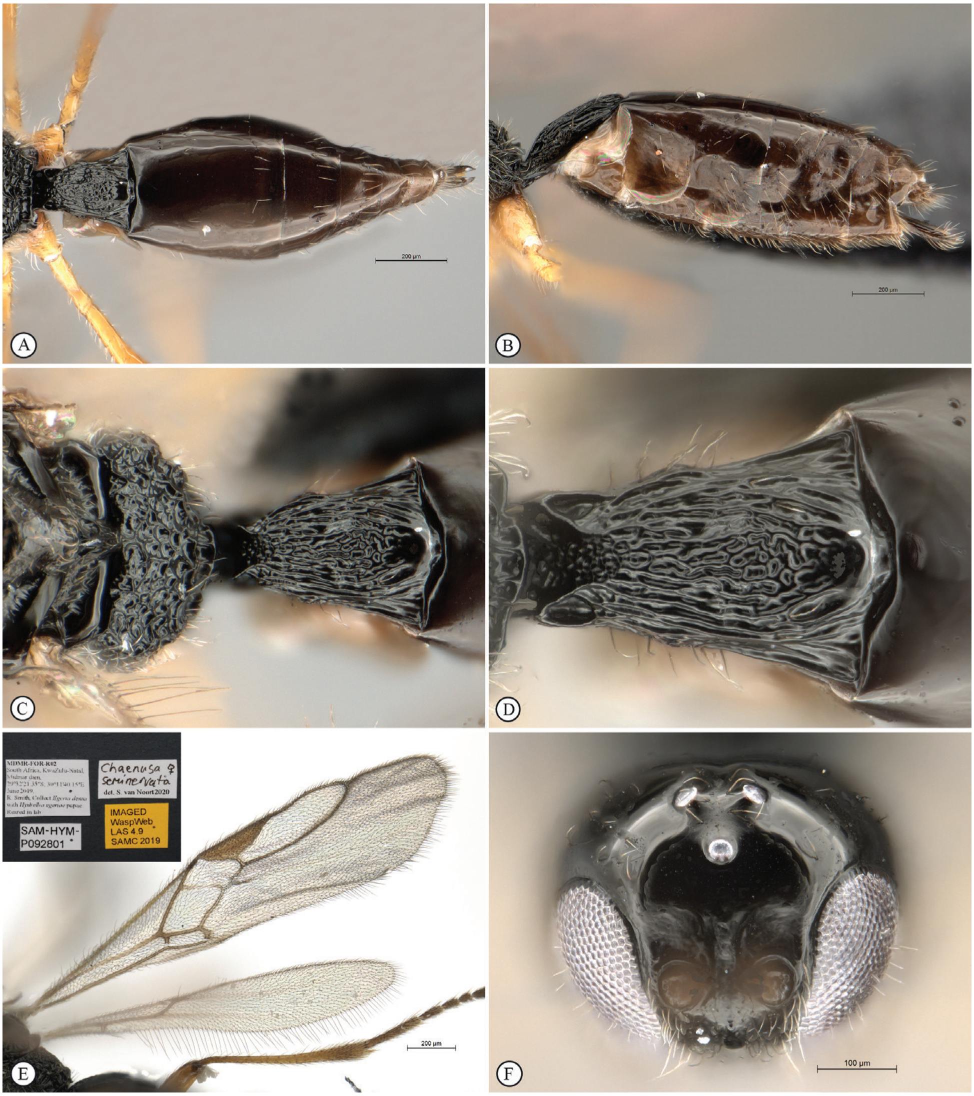


Figure 8. *Chaenusa seminervata* female SAM-HYM-P092801 (SAMC) **A** metasoma, dorsal view **B** metasoma, lateral view **C** scutellum, metanotum, propodeum and first tergite, dorsal view **D** first tergite, dorsal view **E** wings, inset: data labels **F** vertex of head.

towards the clypeus than in *C. anervata*, but still more strongly than in males (narrowest ventral width of the face 0.81× broadest dorsal width); however, the overall relative dimensions of the face relative to the broadest width just below the toruli are equivalent in the two sexes, being slightly wider than high (females H:W = 10:12; males H:W = 9:11).

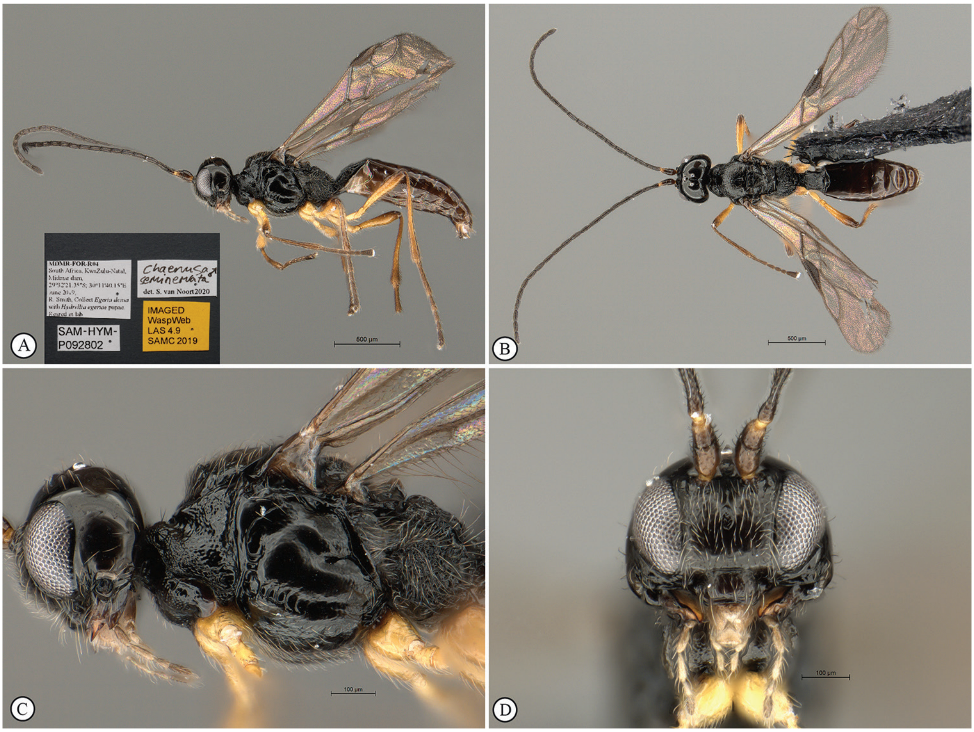


Figure 9. *Chaenusa seminervata* male SAM-HYM-P092802 (SAMC) **A** habitus, lateral view, inset: data labels **B** habitus, dorsal view **C** head and mesosoma, lateral view **D** head, anterior view.

Chaenusa (*Chorebidea*) *testacea* (Granger, 1949)

Chorebidea testacea Granger, 1949.

Syntypes. Madagascar • 2 females, 1 male; (MNHN). Types not seen.

Biology. Unknown.

Distribution. Madagascar.

Subfamily Opiinae Blanchard, 1845
Tribe Opiini Blanchard, 1845
Subtribe Ademonina Fischer, 1964

Genus *Ademon* Haliday, 1833

Ademon Haliday, 1833: 266. Type species: *Bracon decrescens* Nees von Esenbeck, 1812 (1811), by monotypy; type destroyed.

Lytacra Foerster, 1863: 266. Type species: *Lytacra stygia* Foerster, 1863, by monotypy and original designation.

Giardinaia de Stefani-Perez, 1902. Type species: *Giardinaia urinator* de Stefani, 1902, by monotypy.
Analostania Viereck, 1916. Type species: *Analostania tenuipes* Viereck, 1916, by monotypy and original designation.

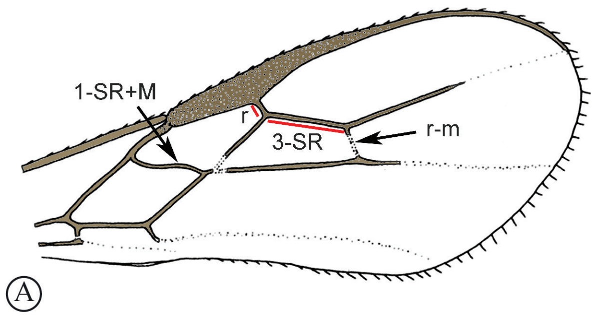
Diagnosis. Heavily-sculptured body with presence of an epicnemial carina (= prepectal carina), more or less developed ventrally; occipital carina complete dorsally; malar suture absent; crenulate depression above eye present; vein SR1 of forewing incomplete, not reaching the wing margin and resulting in an open marginal cell; medio-posteriorly scutellum with continuation of lateral elevated area; hind tibia, tarsus and tarsal claws very slender; second metasomal tergite distinctly longer than third tergite and second metasomal suture distinct (Wu et al. 2014; Wharton 2021).

Distribution. Afrotropical, Nearctic, Oriental and Palaearctic Regions (van Achterberg and Prinsloo 2012).

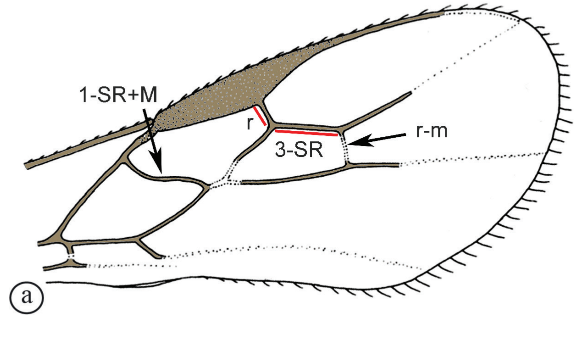
Key to the Afrotropical species of the genus *Ademon* Haliday

Line drawings modified from van Achterberg and Prinsloo 2012.

1 Vein 3-SR of forewing 5.0 times as long as vein r; vein 1-SR+M slightly sinuate; vein r-m inclivous (A).. ***Ademon angolanus***



– Vein 3-SR 2.1–3.5 times as long as vein r; vein 1-SR+M usually strongly sinuate; vein r-m vertical or nearly so (a) .... ***Ademon lagarosiphonae***



Ademon angolanus Fischer, 1963

Holotype. Angola • female; CAS-TYPE-10370 (CASC). Not seen.

Biology. Unknown.

Distribution. Angola.

Ademon lagarosiphonae van Achterberg, 2012

Figs 10–16

Holotype. South Africa • female *Mpumalanga*, Lydenburg Fisheries, Lydenburg, 25°11'S, 30°48'E, 21.xi.2008, J.R. Baars, J.A. Coetzee, G.D. Martin, reared from leaf-miner on *Lagarosiphon major* (Hydrocharitaceae) (SANC examined).

Paratypes. South Africa • 1 female, 1 male; same data as for holotype (SANC examined).

Other material. South Africa • 1 male; Eastern Cape, East London, Nahoon River; 32°57'45.41"S, 27°54'41.59"E; 12 December 2018; R. Smith; Collected from *Egeria densa* infestation with *Hydrellia egeriae* pupae; SAM-HYM-P095098 (SAMC) • 1 female: idem; except for 9 May 2019; R. Smith; Collected from *Egeria densa* infestation with *Hydrellia egeriae* pupae; reared in lab; NHN-FOR-R01; SAM-HYM-P092742 (SAMC) • 1 male: idem; except for NHN-WINTER-FOR-R01; SAM-HYM-P092743 (SAMC) • 1 female: idem; except for NHN-FOR-R02; SAM-HYM-P092744 (SAMC) • 1 male: idem; except for NHN-FOR-R03; SAM-HYM-P092746 (SAMC) • 1 male: idem; except for NHN-FOR-R04; SAM-HYM-P092748 (SAMC) • 1 female: idem; except for NHN-FOR-R05; SAM-HYM-P092750 (SAMC) • 1 female: idem; except for NHN-FOR-R06; SAM-HYM-P092752 (SAMC) • 1 male: idem; except for July 2019; NHN-WINTER-FOR-R03; SAM-HYM-P092747 (SAMC) • 1 female: idem; except for NHN-WINTER-FOR-R04; SAM-HYM-P092749 (SAMC) • 1 male: idem; except for NHN-WINTER-FOR-R05; SAM-HYM-P092751 (SAMC) • 1 female: idem; except for NHN-WINTER-FOR-R06; SAM-HYM-P092753 (SAMC) • 1 female: idem; except for NHN-WINTER-FOR-R07; SAM-HYM-P092756 (SAMC) • 1 female: idem; except for NHN-WINTER-FOR-R08; SAM-HYM-P092757 (SAMC) • 1 male: idem; except for NHN-WINTER-FOR-R09; SAM-HYM-P092759 (SAMC) • 1 female: idem; except for NHN-WINTER-FOR-R10; SAM-HYM-P092760 (SAMC) • 1 male: idem; except for NHN-WINTER-FOR-R11; SAM-HYM-P092761 (SAMC) • 1 male: idem; except for NHN-WINTER-FOR-R12; SAM-HYM-P092764 (SAMC) • 1 female: idem; except for NHN-WINTER-FOR-R13; SAM-HYM-P092765 (SAMC) • 1 female: idem; except for NHN-WINTER-FOR-R14; SAM-HYM-P092767 (SAMC) • 1 male: idem; except for NHN-WINTER-FOR-R15; SAM-HYM-P092768 (SAMC) • 1 male: idem; except for NHN-WINTER-FOR-R16; SAM-HYM-P092769 (SAMC) • 1 female: idem; except for NHN-WINTER-FOR-R17; SAM-HYM-P092770 (SAMC) • 1 female: idem; except for NHN-WINTER-

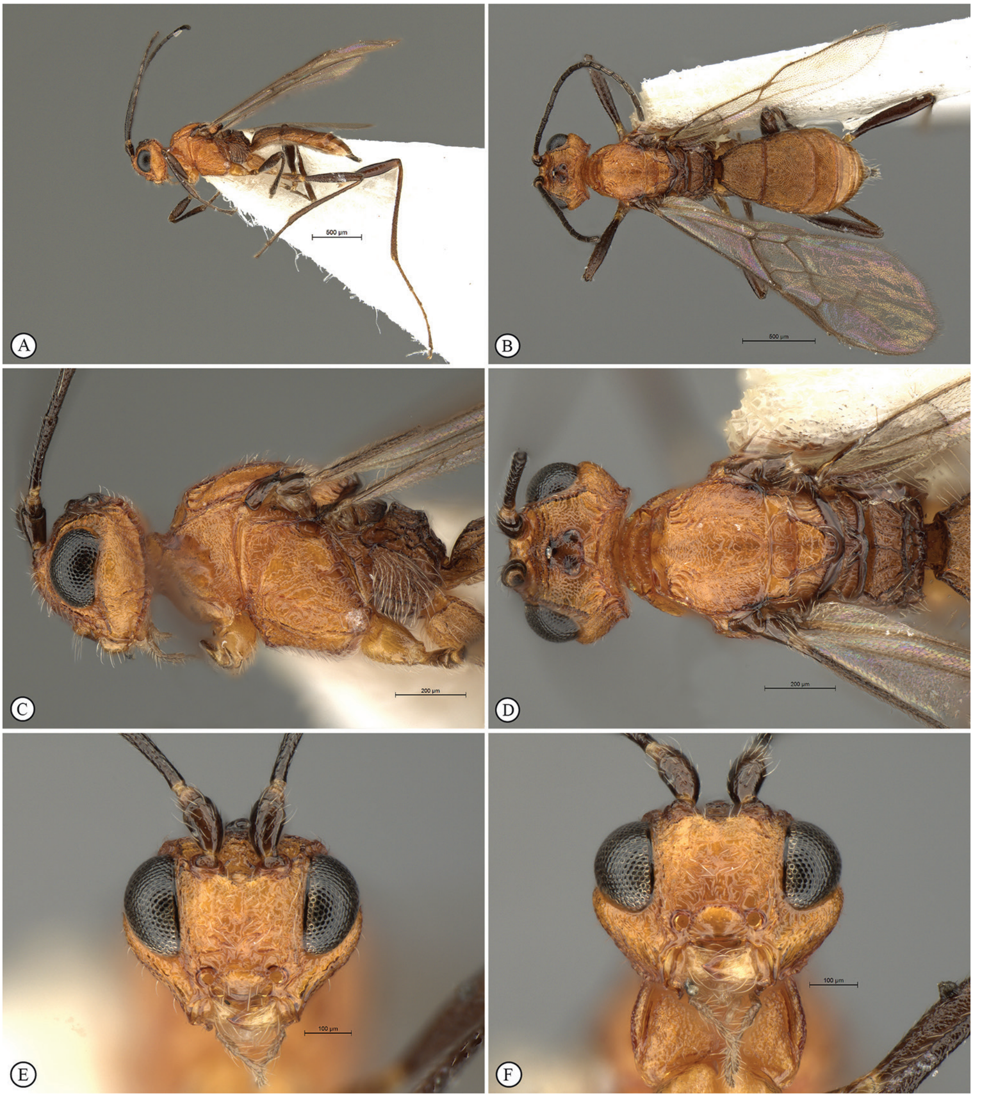


Figure 10. *Ademon lagarosiphonae* Holotype female TYPH01926 (SANC) **A** habitus, lateral view **B** habitus, dorsal view **C** head and mesosoma, lateral view **D** head and mesosoma, dorsal view **E** head, anterior view **F** head, ventroanterior view.

FOR-R18; SAM-HYM-P092771 (SAMC) • 1 male: idem; except for NHN-WINTER-FOR-R19; SAM-HYM-P092772 (SAMC) • 1 male: idem; except for NHN-WINTER-FOR-R20; SAM-HYM-P092773 (SAMC) • 1 male: idem; except for NHN-WINTER-FOR-R21; SAM-HYM-P092774 (SAMC) • 1 male: idem; except for NHN-WINTER-FOR-R22; SAM-HYM-P092775 (SAMC) • 1 male: idem; except for NHN-WINTER-FOR-R23; SAM-HYM-P092776 (SAMC) • 1 male: idem; except for NHN-WINTER-FOR-R24; SAM-HYM-P092777 (SAMC) • 1 female:

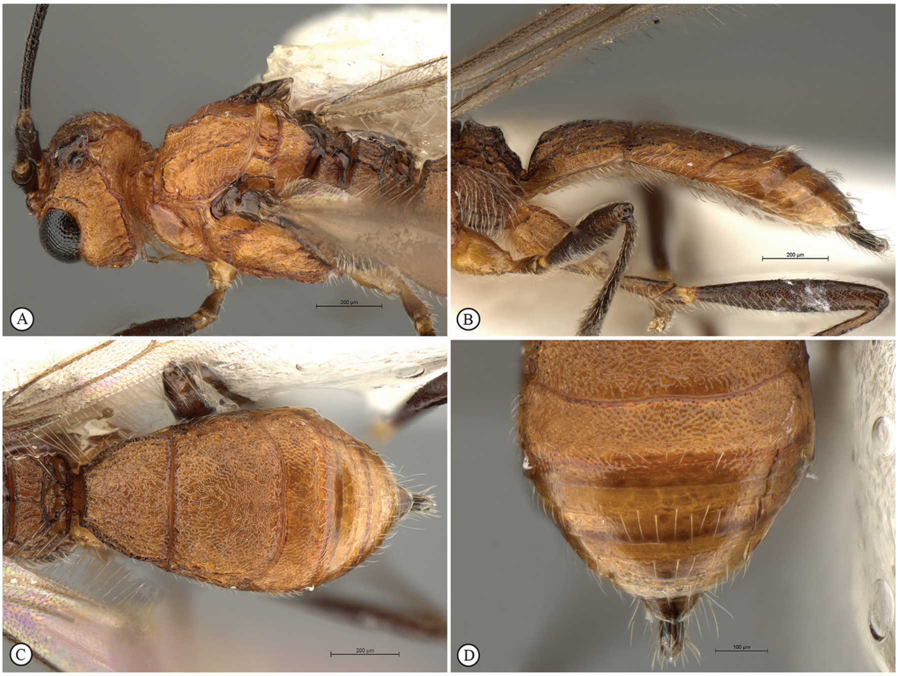


Figure 11. *Ademon lagarosiphonae* Holotype female TYPH01926 (SANC) **A** head and mesosoma, latero-dorsal view **B** metasoma, lateral view **C** metasoma, dorsal view **D** metasomal terminal tergites, dorsal view.

Figure 12. *Ademon lagarosiphonae* Holotype female TYPH01926 (SANC) **A** scutellum, metanotum and propodeum, dorsal view **B** metasomal tergites 1–2, lateral view **C** forewing **D** data labels.

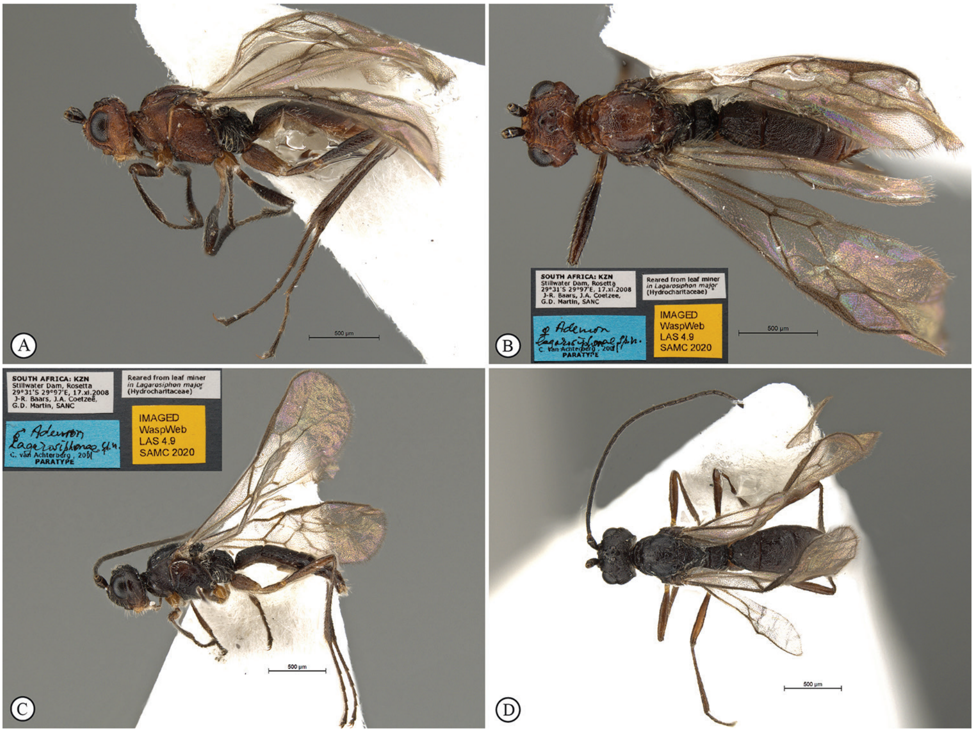


Figure 13. *Ademon lagarosiphonae* Paratype female (**A, B**) and paratype male (**C, D**) (SANC) **A** habitus, lateral view **B** habitus, dorsal view, inset: data labels **C** habitus, lateral view, inset: data labels **D** habitus, dorsal view.

idem; except for NHN-WINTER-FOR-R25; SAM-HYM-P092778 (SAMC) • 1 female: idem; except for NHN-WINTER-FOR-R26; SAM-HYM-P092779 (SAMC) • 1 female: idem; except for NHN-WINTER-FOR-R27; SAM-HYM-P092780 (SAMC) • 1 female: idem; except for NHN-WINTER-FOR-R28; SAM-HYM-P092781 (SAMC) • 1 male: idem; except for NHN-WINTER-FOR-R30; SAM-HYM-P092782 (SAMC) • 1 male: idem; except for NHN-WINTER-FOR-R31; SAM-HYM-P092783 (SAMC) • 1 male: idem; except for NHN-WINTER-FOR-R32; SAM-HYM-P092784 (SAMC) • 1 male: idem; except for NHN-WINTER-FOR-R33; SAM-HYM-P092785 (SAMC) • 1 female: idem; except for NHN-WINTER-FOR-R34; SAM-HYM-P092786 (SAMC) • 1 male: idem; except for NHN-WINTER-FOR-R35; SAM-HYM-P092787 (SAMC) • 1 male: idem; except for NHN-WINTER-FOR-R36; SAM-HYM-P092788 (SAMC) • 1 female: idem; except for NHN-WINTER-FOR-R37; SAM-HYM-P092789 (SAMC) • 1 female: idem; except for NHN-WINTER-FOR-R38; SAM-HYM-P092790 (SAMC) • 1 male: idem; except for NHN-WINTER-FOR-R39; SAM-HYM-P092791 (SAMC) • 1 male: idem; except for NHN-WINTER-FOR-R40; SAM-HYM-P092792 (SAMC) • 1 female: idem; except for NHN-WINTER-FOR-R41; SAM-HYM-P092793 (SAMC) • 1 female: idem; except for NHN-WINTER-FOR-R42; SAM-

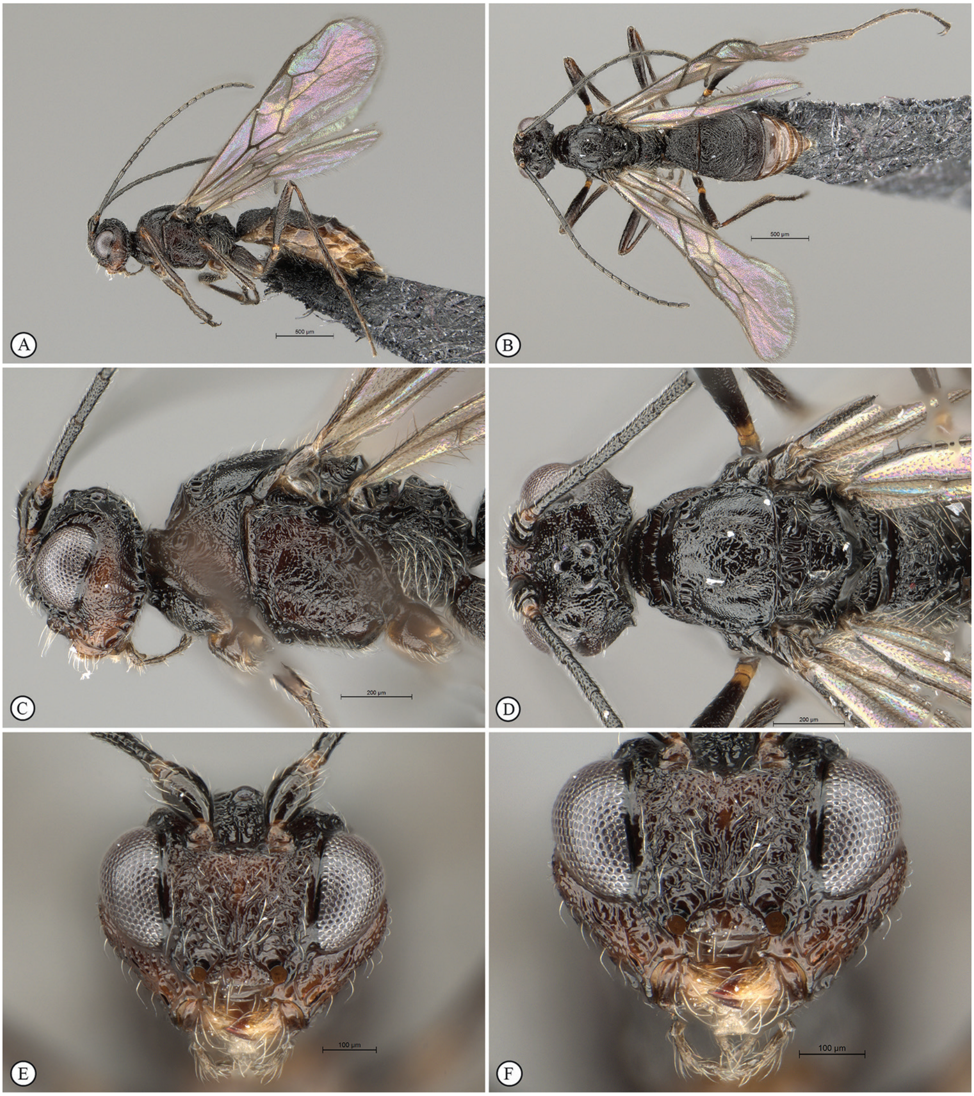


Figure 14. *Ademon lagarosiphonae* female SAM-HYM-P092756 (SAMC) **A** habitus, lateral view **B** habitus, dorsal view **C** head and mesosoma, lateral view **D** head and mesosoma, dorsal view **E** head, anterior view **F** head, ventroanterior view.

HYM-P092794 (SAMC) • 1 male: idem; except for NHN-WINTER-FOR-R43; SAM-HYM-P092795 (SAMC) • 1 female: idem; except for NHN-WINTER-FOR-R44; SAM-HYM-P092796 (SAMC) • 1 male: idem; except for NHN-WINTER-FOR-R45; SAM-HYM-P092797 (SAMC) • 1 male: idem; except for NHN-WINTER-FOR-R46; SAM-HYM-P092798 (SAMC) • 1 female: idem; except for NHN-WINTER-FOR-R47; SAM-HYM-P092799 • 1 male; KwaZulu-Natal; Midmar Dam; 29°32'21.35"S, 30°11'40.15"E; June 2019; R. Smith; Collected from

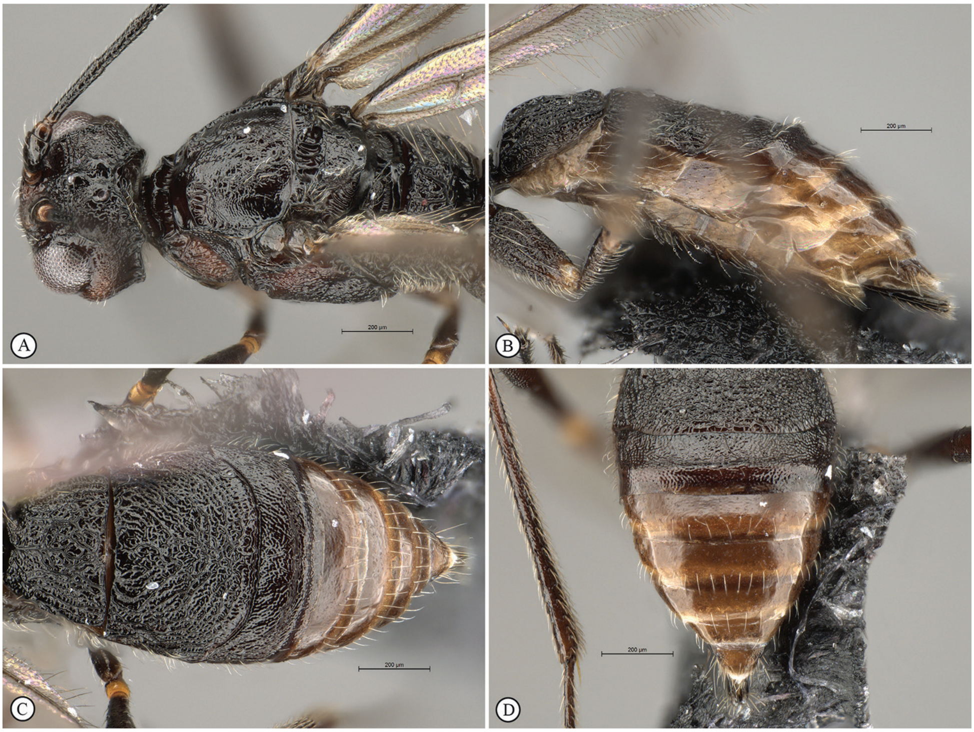


Figure 15. *Ademon lagarosiphonae* female SAM-HYM-P092756 (SAMC) **A** head and mesosoma, latero-dorsal view **B** metasoma, lateral view **C** metasoma, dorsal view **D** metasomal terminal tergites, dorsal view.

Egeria densa infestation with *Hydrellia egeriae* pupae; reared in lab; MDMR-FOR-R03; SAM-HYM-P092745 (SAMC) • 1 male: idem; except for MDMR-FOR-R06; SAM-HYM-P092754 (SAMC) • 1 male: idem; except for MDMR-FOR-R07; SAM-HYM-P092755 (SAMC) • 1 male: idem; except for MDMR-FOR-R08; SAM-HYM-P092758 (SAMC) • 1 male: idem; except for MDMR-FOR-R11; SAM-HYM-P092762 (SAMC) • 1 female: idem; except for MDMR-FOR-R12; SAM-HYM-P092763 (SAMC) • 1 male: idem; except for MDMR-FOR-R13; SAM-HYM-P092766 (SAMC).

Biology. Parasitoid of aquatic leaf-mining flies (Ephydridae): *Hydrellia lagarosiphon* on *Lagarosiphon major* (Hydrocharitaceae) and *Hydrellia egeriae* on *Egeria densa* (Hydrocharitaceae).

Distribution. South Africa.

Comments. This species exhibits a disparate range of colour forms, from being completely black (Figs 14 A–F; 15 A–F; 16A, B) through to being completely yellowish-orange, as in the holotype (Figs 10 A–F; 11 A–D; 12 A, B) with intermediate grades present (Figs 13A, B; 16E, F). This extent of intra-specific colour difference is also present in the Palaearctic type species of the genus, *A. descrescens* (Nees, 1812 [1811]) (van Achterberg and Prinsloo 2012).

Figure 16. *Ademon lagarosiphonae* females SAM-HYM-P092756 (**A–D**), SAM-HYM-P092796 (**E**), SAM-HYM-P092744 (**F**) (SAMC) **A** scutellum, metanotum and propodeum, dorsal view **B** metasomal tergites 1–2, lateral view **C** forewing **D** data labels **E** habitus, lateral view, inset: data labels **F** habitus, lateral view, inset: data labels. Figures **E** and **F** illustrate intermediate colour forms.

Family Eulophidae

Subfamily Entedoninae Foerster, 1856

Janicharis Gumovsky & Delvare, 2006

Type species. *Janicharis africanus* Gumovsky & Delvare, 2006, by monotypy and original designation.

Janicharis africanus Gumovsky & Delvare, 2006

Fig. 17

Holotype. Cameroon • female; Maroua, Djarengol; Malaise trap; 26.ix.1984; G. Delvare (MNHN not seen).

Paratypes. Cameroon • 3 females, idem (CIRAD) • 3 females, idem (RMNH) • Nigeria • Oyo, Ibadan, Iita Compound; x.1987; J. Noyes (NHMUK) • Madagascar • Lac Alaotra; on *Oryza sativa*, 17.x.1991; P. Bousses (CIRAD). Paratypes not seen.

Other material. South Africa • 1 female: *Eastern Cape*, East London, Nahoon river; 32°57'45.41"S, 27°54'41.59"E; NHN-WINTER-FOR-R02; July 2019; R. Smith; reared in laboratory; ex *Hydrellia egeriae* pupa collected from host plant *Egeria densa*; SAM-HYM-P092807 (SAMC) • 1 female: idem; except for NHN-WINTER-FOR-R29 and SAM-HYM-P092808 (SAMC) • 1 female: idem; except for: February 2019; R. Smith; Collected from *Egeria densa* infestation with *Hydrellia egeriae* pupae; SAM-HYM-P095099 (SAMC) • 1 male: idem; except for SAM-HYM-P095100 (SAMC).

Diagnosis. Uniquely defined by two large foveae situated anterio-medially on propodeum; anterolateral propodeal strip wide, somewhat angulate above spiracle. Characters shared with morphologically-similar congeners: pronotum dorsally reduced, placed significantly below the level of mesoscutum; propodeum with anterolateral propodeal strips; anterior propodeum with basal cup and foveae on sides; metanotum with anteriorly-delimited foveae at sides of dorsellum; long postmarginal vein (Gumovsky et al. 2006).

Biology. Previously unknown. Here, we record the species as a parasitoid associated with immature stages of the aquatic ephydrid fly *Hydrellia egeriae*, having been reared from puparia along with specimens of *Ademon lagarosiphonae* and *Chaenusa seminervata* and hence is potentially a hyperparasitoid attacking the braconids rather than the fly. The eulophid subfamily Entedoninae harbours a wide range of life style strategies including species that are usually solitary or gregarious endoparasitoids (more rarely ectoparasitoids or hyper-parasitoids) of concealed dipteran, lepidopteran, coleopteran, hymenopteran or hemipteran larvae or rarely of eggs or pupae. *Janicharis africanus* is morphologically similar to the genera *Hakuna* Gumovsky & Delvare, 2006 and *Pediocharis* Bouček, 1988 (Gumovsky et al. 2006) and may, therefore, exhibit similar lifestyle strategies. The monotypic species *Hakuna matata* Gumovsky & Bouček, 2006 was reared from conical insect galls on a forest plant and each gall contained several pupae in separate cells; adult wasps emerged through a single hole at the apex of the gall. Based on these notes by the collector, Gumovsky et al. (2006) hypothesised *H. matata* to be a parasitoid of the gall former. Biology of *Pediocharis* is unknown and, together with the lack of detail concerning the biology of *Hakuna*, makes it difficult to predict whether *J. africanus* is, indeed, a hyper-parasitoid or not. A more remote possibility of morphological congeneric similarity for *Janicharis* is to *Chrysocharis* Foerster, 1856 (Gumovsky et al. 2006), but this genus contains a very broad range of lifestyle strategies, including endo- and ectoparasitoids and facultative hyperparasitoids (Yu et al. 2016), which does not provide any further enlightenment as to potential possibilities for *Janicharis*. The only recourse is to pursue direct investigation of the biology for *J. africanus* in the field.

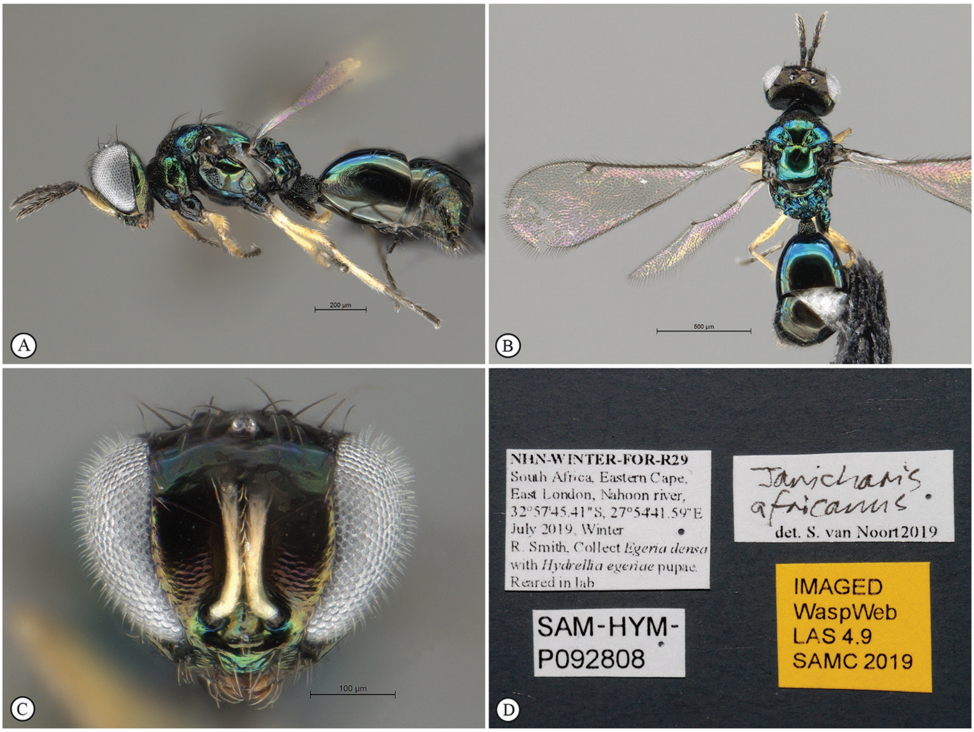


Figure 17. *Janicharis africanus* female SAM-HYM-P092808 (SAMC) **A** habitus, lateral view **B** habitus, dorsal view **C** head, anterior view **D** data labels.

Distribution. Cameroon, Nigeria, Madagascar and South Africa (new country record).

Comments. The reared specimens were identified by corroboration of morphological character attributes with the original description and type photographs of *J. africanus* (Gumovsky et al. 2006). The genus is monotypic.

Discussion

This paper contributes towards an understanding of the impact of parasitoid wasps on potential biocontrol agents of invasive waterweeds, specifically that of Brazilian waterweed, which is targeted by biocontrol agents in the genus *Hydrellia*. Numerous studies have been conducted in the New World and Oriental Region assessing, in particular, species delimitation and host relationships of *Chaenusa* species (Kula et al. 2006; Kula and Zolnerowich 2008; Kula 2009; Kula et al. 2009; Kula and Harms 2016). Efficacy of the biocontrol agent can potentially be affected by parasitoids and the extent to which these *Chaenusa* parasitoid wasps, as well as species of *Ademon* and *Janicharis*, affect these waterweed biocontrol programmes in various parts of the world is under ongoing investigation, including in South Africa (Rosali Smith, in prep.). *Janicharis africanus* may be a hyper-parasitoid of the braconids, further complicating the impact of the biocontrol efficacy of *Hydrellia egeriae*, although if it is a hyper-parasitoid, this species should potentially have a positive impact on the biocontrol programme. Elucidation of the precise lifestyle strategy of *J. africanus* is under ongoing investigation by the Centre for Biological Control at Rhodes University (South Africa). Ramifications of adaptation by the indigenous parasitoids, documented in this paper, to introduced hosts released as potential biocontrol agents against targeted invasive species in South Africa, will be detailed in an accompanying publication (Smith, Coetzee, van Noort, in prep). This paper provides a taxonomic contribution towards resources that will facilitate identification of parasitoid wasps reared in the process of establishing effective control programmes for invasive waterweeds in Africa.

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RESEARCH ARTICLE

African Invertebrates
A journal of biodiversity research

Taxonomic revision of the *Calotheca parvula* species group from southern Africa, with descriptions of three new species (Coleoptera, Chrysomelidae)

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Abstract

Calotheca Heyden, 1887 is a flea beetle genus that occurs predominantly in sub-Saharan Africa, comprising 29 species. The examination of new material is revealing a significantly higher species richness and high intraspecific variability. A group of five species, occurring in the southernmost portion of the distribution range for the genus, is here attributed to the *C. parvula* species group: *C. parvula* (Weise, 1908), *C. pallida* (Bryant, 1945), *C. danielssoni* **sp. nov.**, *C. oberprieleri* **sp. nov.**, and *C. prinslooi* **sp. nov.** Species in the *C. parvula* group have strong similarities in body shape and sculpture on the integument, spermathecal shape, and for most species the morphology of the median lobe of the aedeagus. A key to species of the *Calotheca parvula* group is provided along with photographs of the habitus, main diagnostic characters, median lobe of the aedeagus and spermatheca. In addition to the geographic distribution, the available information on the habitat, host plants, and phenology are provided for the five species analysed.

Keywords

Afrotropical Region, Alticini, diagnostic key, Galerucinae

Introduction

The Alticini are a tribe of leaf beetles (Coleoptera, Chrysomelidae), included in the subfamily Galerucinae, along with the closely related Galerucini (Bouchard et al. 2011). They are the largest and most diverse tribe of leaf beetles, comprising over 540 genera and about 8000 extant species (Nadein 2012; Nadein and Bezděk 2014) and occur all over the world. Alticini are commonly defined as "flea beetles" because they have a metafemoral extensor tendon that enables them to jump (Furth and Suzuki 1998; Ge et al. 2011; Nadein and Betz 2016). Adult and larval stages feed mainly on the stems, leaves or roots, but rarely on the flowers of almost all the higher plant families in different environments, and generally have high levels of specialization (Jolivet and Verma 2002; Biondi et al. 2015; D'Alessandro et al. 2018b). The Afrotropical flea beetle fauna includes about 1600 known species in 103 genera, but a steady rise in the number of genera and species described during the last 10 years from this region, and the amount of unidentified material preserved in public collections and depositories, show that this taxon is still far from being fully known in Africa (Biondi and D'Alessandro 2008, 2010a, b, 2012, 2013a, b, 2015, 2016, 2017, 2018a, b; Döberl 2010; D'Alessandro et al. 2012, 2014, 2018a, 2019, 2020; Biondi 2017; Biondi et al. 2019, 2020; Biondi, unpublished data; D'Alessandro and Biondi 2018). The Afrotropical flea beetle genus *Calotheca* Heyden, 1887 was recently separated from the genus *Blepharida* Chevrolat, 1836 (Biondi at al. 2017). It is widespread in sub-Saharan Africa, with limited extensions into Israel and the Arabian Peninsula, and occurs in several types of forest and savannah environments (D'Alessandro et al. 2018a, b, 2019, 2020; Biondi et al. 2019). It can be characterised by the sinuate, deeply impressed frontal grooves, which extend from the dorsal ocular margin to the interantennal space, and the punctate lateral striae on the pronotum. These extend from the anterior margin to the disc and generally are L- or C-shaped. Some species also show short lateral longitudinal furrows or small dimples close to the pronotal base.

In the present contribution we reviewed the taxonomic status of *Calotheca parvula* (Weise, 1908), from the Republic of South Africa and Namibia, *C. pallida* (Bryant, 1945), from the Republic of South Africa, and three new species here described from the Republic of South Africa, *C. danielssoni* sp. nov., *C. oberprieleri* sp. nov., and *C. prinslooi* sp. nov.

Material and methods

Material examined consists of 91 dried pinned specimens preserved in the institutions listed under the abbreviations. The specimens were examined, and measurements and dissections were executed, under a Leica M205C stereo microscope. Photographs were taken using a Leica DFC500 camera and compiled using Zerene Stacker software version 1.04. Scanning electron micrographs were taken using a Hitachi TM-1000. Terminology follows D'Alessandro et al. (2016) for the median lobe of aedeagus, and Furth and Suzuki (1994) for the spermatheca. Geographical coordinates for the localities were reported in degrees and minutes (WGS84 format); coordinates and geographical information that are included in square brackets were added to the label data by the authors using data from the Google Earth website. The internationally recognised codens of the depositories follow the list on The Insect and Spider Collections of the World Website (Evenhuis 2020). Chorotypes follow Biondi and D'Alessandro (2006).

Abbreviations

Collections and depositories:

BAQ Italy, University of L'Aquila, Collection of M. Biondi;
MCZC USA, Massachusetts, Cambridge, Harvard University, Museum of Comparative Zoology;
MZLU Sweden, Lund, Lund University;
NHMUK United Kingdom, London, The Natural History Museum;
SANC South Africa, Pretoria, South African National Collection of Insects;
UWCP Poland, Wroclaw, University of Wroclaw;
ZMHB Germany, Berlin, Museum für Naturkunde der Humboldt-Universität.

Morphology:

LA numerical sequence proportional to the length of each antennomere;
LAED length of aedeagus;
LAN length of antennae;
LB total length of body (from apical margin of head to apex of elytra);
LE length of elytra;
LP medial length of pronotum;
LSP maximum length of spermatheca, including ductus;
WE maximum width of elytra combined;
WP maximum width of pronotum.

Republic of South Africa: **RSA**; Provinces:

ECape Eastern Cape;
NCape Northern Cape;
WCape Western Cape.

Results

***Calotheca danielssoni* sp. nov.**
http://zoobank.org/6B90C1D8-01C0-4047-813A-B5B8319DF4EA
Figs 1A–E, 6

Calotheca parvula (Weise): Biondi et al. 2017: 124 (pars)

Type material. *Holotype* ♂: South Africa [RSA], Northern Cape, Vanrhyns[dorp] Pass [near Nieuwoudtville, 31°22'40"S, 19°01'04"E], W slope (R27), 660–760 m,

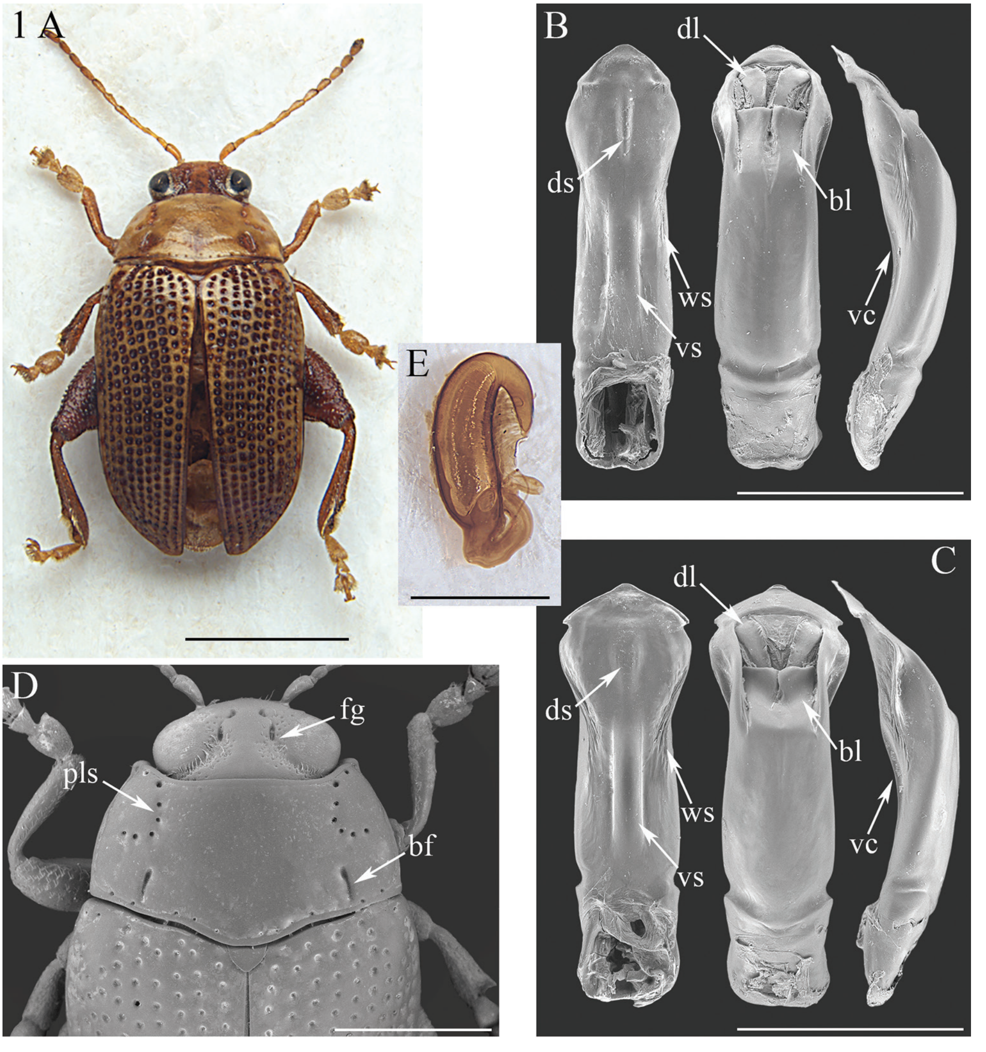

Figure 1. *Calotheca danielssoni* sp. nov. **A** habitus, ♂ (RSA: WCape, 10 Km S Citrusdal) **B** median lobe of aedeagus, from left to right in ventral, dorsal, and lateral view (RSA: WCape, 10 Km S Citrusdal) **C** ditto (holotype) **D** head, pronotum, and basal part of elytra, ♂ (RSA: WCape, Bidouw Valley) **E** spermatheca (RSA: WCape, Gifberg Pass). Abbreviations: bf = basal furrow; bl = basal lobe of dorsa ligula; dl = distal lobe of dorsa ligula; ds = distal sulcus; fg = frontal groove; pls = punctate lateral stria; vc = ventral carina; vs = ventral sulcus; ws = wrinkled surface. Scale bars: 2 mm (**A**); 1 mm (**B, D**); 0.5 mm (**E**).

fynbos, on *Rhus* sp., 16.ix.1994, P. Audisio, M. Biondi & M.A. Bologna leg. (SANC). ***Paratypes*:** Republic of South Africa: Cape Prov. [WCape] Koomplanskloof [sic!], 10 km S Citrusdal, 200–270 m, 32°40'S, 19°01'E, 04–08.x.1994, R. Danielsson leg., 1♂ (MZLU); C.P. [WCape], Gifberg Pass, 250–560 m, 31°45'S, 18°47'E, 17.ix.1986, R.[G.] Oberprieler leg., 1♂, 1♀ (SANC); C.P. [WCape], Clanwilliam District, Bidouw Valley, 32°08'S, 19°14'E, 7.ix.1987, C.D. Eardley leg. 1♂ (BAQ); WCape, Cederberg

Wilderness Area, Bosherberge, 650 m, -32.3987, 19.0907 [32°23'55"S, 19°05'26"E], lamp & night collection, 6.xii.2012, M. Wanat leg., 1♀ (UWCP); WCape, neigh. Piekenaarskloof Pass, 475 m (wet fynbos), 32°37.050'S, 18°57.458'E [32°37'04"S, 18°57'12"E], on *Rhus* sp., 13.ix.2006, M. Biondi & A. De Biase leg., 1♀ (BAQ); WCape, Groenkol Farm near Graafwater, 32°06'S, 18°42'E, 450 m, 15.iv.1997, R. Oberprieler & R. Stals leg., 1♀ (SANC).

Diagnosis. *Calotheca danielssoni* sp. nov. can be distinguished from the other species in the group by the elytral punctures, which are larger and more deeply impressed than those of the pronotal striae (Fig. 1A, D) (elytral punctures as large as, or smaller than, those of the pronotal striae in the other species). Males are similar to *C. parvula* regarding their small size and the generally darker colour, but are easily distinguishable by the basal pro- and mesotarsomere which are distinctly enlarged (only moderately enlarged in *C. parvula*) (Figs 1A, 4A), and the very different shape of the median lobe of the aedeagus (Figs 1B, C, 4C); females are clearly larger than in *C. parvula*. Based on the aedeagus, *C. danielssoni* sp. nov. shows major similarities with *C. pallida*, *C. oberprieleri* sp. nov. and *C. prinslooi* sp. nov. (Figs 1B, C, 2C, 3C, 5C), this is due to: the narrow medial sulcus in the apical third; the apex bearing small ventrolateral bulges (more prominent laterally in some specimens); the paired ventral carinae delimiting a wide ventral sulcus (present in *C. pallida* and *C. prinslooi* sp. nov.); and the dorsal ligula formed by two basal and two apical distal lobes. The aedeagus of *C. danielssoni* sp. nov. is, however, easily distinguishable by the apical part, which is distinctly wider than the remaining length, and the dorsal ligula, with shorter and clearly truncate basal lobes and more elongate distal lobes (Fig. 1B, C).

Description of the holotype (♂). Body elongate-elliptical in dorsal view (cf. Fig. 1A), moderately convex in lateral view; total body length (LB) = 4.70 mm; maximum pronotal width at base (WP = 2.08 mm); and maximum elytral width in basal third (WE = 2.50 mm). Head, femora and tibiae pale brown; frons, labrum, antennae, and tarsi paler brown; pronotum yellow, punctate lateral striae and basal furrows slightly darkened; elytra yellow with wide darkened punctures, small irregular reddish patches on the last interstria, and very sparse reddish patches on the disc. Head (cf. Fig. 1D) with surface rough, and micropunctate; several deeply impressed setiferous punctures between medial ocular margin and frontal grooves, and near the dorsal section of frontal grooves; frontal grooves deeply impressed, more so anteriorly, sinuate, extending from dorsal ocular margin to interantennal space; interantennal space about 1.5 times the length of the first antennomere; eyes elongate-ovate; dorsal interocular space slightly narrower than 1.5 times the transversal width of the eye; antennae slightly shorter than half the body length (LAN = 2.08 mm; LAN/LB = 0.44; LA: 100:40: 53:60:67:67:67:67:67:60:87). Pronotum (cf. Fig. 1D) barely convex, sub-trapezoidal, distinctly transverse (LP = 1.00 mm; WP/LP = 2.08), with distinctly rounded sides; surface smooth, sparsely micropunctate, with additional small, rather dense but evenly distributed punctation; lateral pronotal striae C-shaped, with large deeply impressed punctures; basal furrows of pronotum deeply impressed; basal and apical margins with distinct borders, but not raised; lateral margins only slightly expanded, but visible in dorsal view; anterior angles prominent and pointed; posterior angles slightly obtuse. Scutellum sub-triangular, rounded apically. Elytra (cf. Fig. 1A, D) moderately elongate and convex (LE = 3.50 mm; WE/LE = 0.71; LE/LP = 3.50), slightly sinuate laterally, jointly rounded apically; lateral margin narrow, barely visible in dorsal view; elytral punctation arranged in single regular rows formed by deeply impressed punctures; interstriae with finely microreticulate and micropunctate surface; last interstria carinate; humeral calli barely raised. Macropterous. Legs with basal pro- and mesotarsomeres distinctly enlarged (cf. Fig. 1A). Tarsal claws simple. Underside brown; apical abdominal ventrite without preapical sculpture or impressions. Median lobe of aedeagus (Fig. 1C) (LAED = 1.83 mm; LE/LAED = 1.92) with apical third distinctly wider than base in ventral view; apex subtriangular, widely obtuse, protruding laterally, with a rounded median tooth; ventral surface with two parallel carinae delimiting a rather wide sulcus which becomes shallower distally, and a narrow distal sulcus in the apical third; ventrolateral surface wrinkled medially; dorsal ligula short, formed by two basal lobes which are sub-rectangular and truncate apically, and two apical lobes which are subtriangular becoming wider distally; in lateral view, median lobe distinctly bent down to the apex.

Variability. Males (n = 4; mean ± standard deviation, range): LE = 3.45 ± 0.27 mm (3.05 ≤ LE ≤ 3.65 mm); WE = 2.44 ± 0.13 mm (2.25 ≤ WE ≤ 2.55 mm); LP = 1.04 ± 0.05 mm (1.00 ≤ LP ≤ 1.10 mm); WP = 2.03 ± 0.11 mm (1.88 ≤ WP ≤ 2.13 mm); LAN = 2.18 ± 0.18 mm (2.00 ≤ LAN ≤ 2.40 mm); LAED = 1.82 ± 0.12 mm (1.75 ≤ LAED ≤ 1.85 mm); LB = 4.60 ± 0.38 mm (4.05 ≤ LB ≤ 4.90 mm); LE/LP = 3.32 ± 0.21 (3.05 ≤ LE/LP ≤ 3.50); WE/WP = 1.20 ± 0.01 (1.19 ≤ WE/WP ≤ 1.20); WP/LP = 1.96 ± 0.08 (1.88 ≤ WP/LP ≤ 2.08); WE/LE = 0.71 ± 0.03 (0.67 ≤ WE/LE ≤ 0.74); LAN/LB = 0.47 ± 0.02 (0.44 ≤ LAN/LB ≤ 0.49); LE/LAED = 1.89 ± 0.10 (1.74 ≤ LE/LAED ≤ 1.97). **Females** (n = 4; mean ± standard deviation; range): LE = 4.48 ± 0.29 mm (4.25 ≤ LE ≤ 4.90 mm); WE = 3.21 ± 0.20 mm (3.05 ≤ WE ≤ 3.45 mm); LP = 1.19 ± 0.03 mm (1.15 ≤ LP ≤ 1.20 mm); WP = 2.52 ± 0.12 mm (2.43 ≤ WP ≤ 2.70 mm); LAN = 2.34 ± 0.09 mm (2.25 ≤ LAN ≤ 2.43 mm); LSP = 0.74 ± 0.01 mm (0.73 ≤ LSP ≤ 0.75 mm); LB = 5.86 ± 0.26 mm (5.60 ≤ LB ≤ 6.20 mm); LE/LP = 3.77 ± 0.21 (3.63 ≤ LE/LP ≤ 4.08); WE/WP = 1.28 ± 0.06 (1.22 ≤ WE/WP ≤ 1.36); WP/LP = 2.12 ± 0.09 (2.04 ≤ WP/LP ≤ 2.25); WE/LE = 0.72 ± 0.04 (0.69 ≤ WE/LE ≤ 0.78); LAN/LB = 0.39 ± 0.01 (0.38 ≤ LAN/LB ≤ 0.41); LE/LSP = 6.02 ± 0.35 (5.80 ≤ LE/LSP ≤ 6.53). Paratypes similar in shape, sculpture and colour to the holotype, but the darkened elytral patches are slightly variable. In one specimen the median lobe of aedeagus with apical third less expanded, the apex bearing small ventrolateral bulges rather than protruding laterally (Fig. 1B). Female with basal pro- and mesotarsomeres less enlarged than in male. Spermatheca (Fig. 1E) subcylindrical and generally straight basally, moderately slender to thickset; distal part clearly curved, slightly narrower apically, with a very short appendix; distal part shorter than half the length of the basal part; ductus basally inserted, moderately elongate, with either a narrow coil or a hint of a coil.

Etymology. The specific epithet is a noun in the genitive case after Roy Danielsson (Sweden, Lund), one of its collectors.

Distribution. Republic of South Africa (NCape, WCape) (Fig. 6). Chorotype: Southern-Western Afrotropical (SWA).

Ecological notes. Collected in fynbos and wet fynbos vegetation, between 200–760 m a.s.l., on *Searsia* sp. [= *Rhus* pars, cf. Moffett (2007)] (Anacardiaceae). Adults active in April, September, October, December.

Calotheca oberprieleri sp. nov.

http://zoobank.org/99547CA8-987A-46D3-B9CC-29EFF844A1FB
Figs 2A–D, 6

Type material. ***Holotype*** **♂:** South Africa [RSA], CP [ECape], Suurberg Nature Reserve, 900 m, 33°16'S, 25°45'E, 28.xi.1988, R.[G.] Oberprieler leg. (SANC). ***Paratypes*****:** Republic of South Africa: Eastern Cape, between Grahamstown and Southwell [Southwell 33°24'58"S, 26°36'24"E], 500 m, 13.xi.2006, G. Osella leg., 1♂ (BAQ); Eastern Cape, W Bisho, km 35 da Peddie s.s.n. 2, 280 m, 33°16'69"S, 26°48'95"E [33°14'24"S, 26°45'22"E], 14.xi.2006, G. Osella leg., 1♂ (BAQ); CP [ECape], Umtiza, East London Coast Reserves, East London, 33°02'S, 27°49'E, 25.xi.1988, B.[=E.] Grobbelaar leg., 1♂ and 1♀ (SANC).

Diagnosis. *Calotheca oberprieleri* sp. nov. is very similar in shape, size, sculpture and colour to *C. pallida* and *C. prinslooi* sp. nov., from which it can be generally distinguished by: surface of median lobe of aedeagus flat ventrally (carinae delimiting a deep sulcus are evident in *C. pallida* and *C. prinslooi* sp. nov.) (Figs 2C, 3C, 5C); median lobe sinuate, narrowing in the apical third, wider basally than apically (sinuate and narrowing medially, and as wide basally as apically in *C. pallida*; and greatest width medially, wider basally than apically and tapering towards the apex in *C. prinslooi* sp. nov.) (Figs 2C, 3C, 5C); spermatheca only known for one specimen, subreniform and thickset basally (broadly subcylindrical and more slender in *C. pallida* and *C. prinslooi* sp. nov.) (Figs 2D, 3D, 5D); pronotal margins which are more rounded laterally (less rounded or more distinctly curved at apical third respectively in *C. pallida* and *C. prinslooi* sp. nov.) (Figs 2B, 3B, 5B).

Description of the holotype (♂). Body elongate-elliptical in dorsal view (Fig. 2A), moderately convex in lateral view; total length of body (LB) = 5.00 mm; maximum pronotal width near base (WP = 2.18 mm); maximum width of elytra in basal third (WE = 2.78 mm). Head, femora, and legs pale brown; pronotum yellow, punctate lateral striae and basal furrows distinctly darkened; elytra yellow, with darkened punctures, and small irregular very sparse shaded reddish patches. Head (cf. Fig. 2B) with surface microreticulate and micropunctate; several setiferous punctures between medial ocular margin and frontal grooves, and near the dorsal part of frontal grooves; frontal grooves deeply impressed, more so anteriorly, sinuate, extending from dorsal ocular margin to interantennal space; interantennal space about 1.5 times the length of the first antennomere; eyes elongate-ovate; dorsal interocular space slightly wider than 1.5 times the transversal width of the eye; antennae slightly shorter than half the body length (LAN = 2.33 mm;

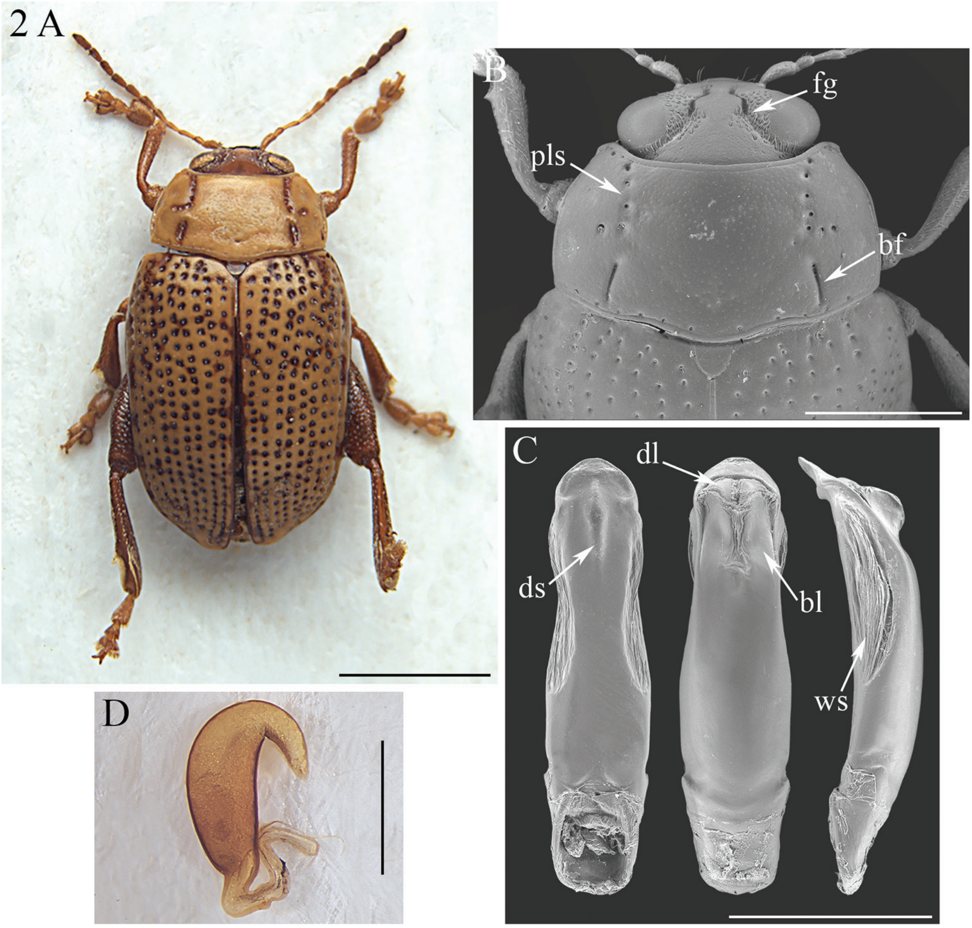

Figure 2. *Calotheca oberprieleri* sp. nov. **A** habitus, ♂ (holotype) **B** head, pronotum, and basal part of elytra, ♂ (RSA: ECape, between Grahamstown and Southwell) **C** median lobe of aedeagus, from left to right in ventral, dorsal, and lateral view (RSA: ECape, between Grahamstown and Southwell) **D** spermatheca (RSA: ECape, Umtiza). Abbreviations: bf = basal furrow; bl = basal lobe of dorsa ligula; dl = distal lobe of dorsa ligula; ds = distal sulcus; fg = frontal groove; pls = punctate lateral stria; ws = wrinkled surface. Scale bars: 2 mm (**A**); 1 mm (**B, C**); 0.5 mm (**D**).

LAN/LB = 0.47; LA: 100:50:75:64:79:79:79:79:79:71:100). Pronotum (cf. Fig. 2B) slightly convex, sub-trapezoidal, distinctly transverse (LP = 1.18 mm; WP/LP = 1.85), with clearly rounded sides; surface microreticulate and micropunctate, with additional small, rather dense, evenly distributed punctation; lateral pronotal striae C-shaped, with large, deeply impressed punctures; basal furrows of pronotum deeply impressed; basal and apical margins distinctly bordered, but not raised; lateral margins barely expanded, but visible in dorsal view; anterior angles prominent and pointed; posterior angles widely obtuse. Scutellum sub-triangular, rounded apically. Elytra (Fig. 2A, cf. 2B) moderately elongate and convex (LE = 3.83 mm; WE/LE = 0.73; LE/LP = 3.26), slightly sinuate laterally, jointly rounded apically; lateral margin narrow, barely visible in dorsal view;

elytral punctation arranged in single regular rows, punctures deeply impressed; interstriae with finely microreticulate and micropunctate surface; last interstria carinate; humeral calli barely raised. Macropterous. Legs with basal pro- and mesotarsomeres distinctly enlarged, sub-triangular (Fig. 2A). Tarsal claws simple. Underside pale brown; apical abdominal ventrite without preapical sculpture or impressions. Median lobe of aedeagus (cf. Fig. 2C) (LAED = 2.08 mm; LE/LAED = 1.84) distinctly sinuate laterally in ventral view; slightly narrower distally than basally; apex subrounded, with small ventrolateral bulges; ventral surface flat, with a narrow medial furrow in distal third; ventrolateral surface widely wrinkled; dorsal ligula short, formed by two elongate basal lobes and two shorter apical lobes; in lateral view, median lobe distinctly bent down to the apex.

Variability. Males (n = 4; mean ± standard deviation, range): LE = 3.99 ± 0.17 mm (3.83 ≤ LE ≤ 4.12 mm); WE = 2.88 ± 0.12 mm (2.78 ≤ WE ≤ 3.05 mm); LP = 1.21 ± 0.04 mm (1.18 ≤ LP ≤ 1.28 mm); WP = 2.30 ± 0.12 mm (2.18 ≤ WP ≤ 2.45 mm); LAN = 2.37 ± 0.11 mm (2.25 ≤ LAN ≤ 2.50 mm); LAED = 2.10 ± 0.12 mm (2.00 ≤ LAED ≤ 2.28 mm); LB = 5.12 ± 0.12 mm (5.00 ≤ LB ≤ 5.28 mm); LE/LP = 3.29 ± 0.06 (3.25 ≤ LE/LP ≤ 3.38); WE/WP = 1.25 ± 0.02 (1.24 ≤ WE/WP ≤ 1.28); WP/LP = 1.90 ± 0.04 (1.85 ≤ WP/LP ≤ 1.94); WE/LE = 0.72 ± 0.01 (0.72 ≤ WE/LE ≤ 0.73); LAN/LB = 0.46 ± 0.02 (0.44 ≤ LAN/LB ≤ 0.48); LE/LAED = 1.90 ± 0.08 (1.84 ≤ LE/LAED ≤ 2.03). **Females** (n = 1): LE = 4.50 mm; WE = 3.38 mm; LP = 1.28 mm; WP = 2.65 mm; LAN = 2.35; LSP = 0.80 mm; LB = 5.75 mm; LE/LP = 3.53; WE/WP = 1.27; WP/LP = 2.08; WE/LE = 0.75; LAN/LB = 0.41; LE/LSP = 5.63. Paratypes very similar in shape, sculpture and colour to the holotype. Female with basal pro- and mesotarsomeres less enlarged than in male. Spermatheca (Fig. 2D) with basal part subreniform, thickset; distal part softly bent, slightly narrower apically, with a very short appendix; distal part clearly shorter than half the length of the basal part; ductus basally inserted, moderately elongate, and with a hint of a coil.

Etymology. The specific epithet is a noun in the genitive case after Rolf G. Oberprieler (Australia, Canberra), one of its collectors.

Distribution. Republic of South Africa (ECape) (Fig. 6). Chorotype: Southern-Western Afrotropical (SWA).

Ecological notes. Habitat and host plants unknown. Collected between 280–900 m a.s.l. Adults active in November.

Calotheca pallida **(Bryant, 1945)**

Figs 3A–D, 6

Blepharidella pallida Bryant, 1945: 340
Calotheca pallida (Bryant): Biondi et al. 2017: 123 (pars)

Type material examined. ***Lectotype*** **♀:** Mossel Bay [34°07'11"S, 22°04'02"E]/S.W. Africa [RSA: WCape], R.E. Turner, Brit. Mus. 1928-119 (M. Biondi des. 2017) (NHMUK). ***Paralectotypes*****:** Same data as lectotype, 1♀ (NHMUK); ditto, Brit. Mus. 1921-210, April 1921, 1♂ (NHMUK).

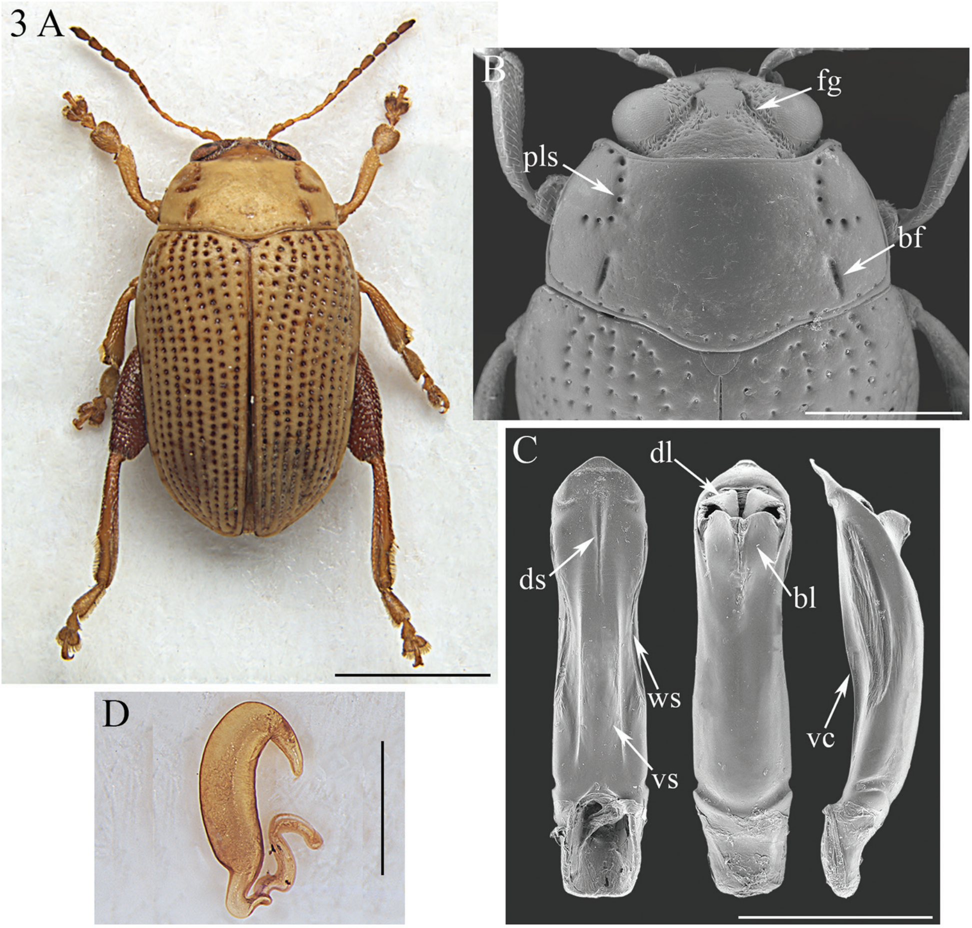

Figure 3. *Calotheca pallida* (Bryant, 1945) **A** habitus, ♂ (RSA: WCape, Stilbaai Nature Reserve) **B** head, pronotum, and basal part of elytra, ♂ (RSA: WCape, Stilbaai Nature Reserve) **C** median lobe of aedeagus, from left to right in ventral, dorsal, and lateral view (RSA: WCape, Mossel Bay) **D** spermatheca (RSA: WCape, Stilbaai Nature Reserve). Abbreviations: bf = basal furrow; bl = basal lobe of dorsa ligula; dl = distal lobe of dorsa ligula; ds = distal sulcus; fg = frontal groove; pls = punctate lateral stria; vc = ventral carina; vs = ventral sulcus; ws = wrinkled surface. Scale bars: 2 mm (**A**); 1 mm (**B, C**); 0.5 mm (**D**).

Additional material examined. Republic of South Africa: Cape Pr. [WCape], Mossel Bay, 34°08'S, 22°10'E, 15.i.1986, J.M. Carpenter leg., 3 specimens (MCZC); ditto, xii.1934. R.E. Turner leg., B.M. 1935-73, 1 specimen (NHMUK); CP [WCape], Stilbaai Nature Res.[erve], 34°22'S, 21°26'E, 02.xii.1988, B.[=E.] Grobbelaar leg., 3 specimens (SANC).

Taxonomic remarks. Head, antennae and legs pale brown; tarsi and basal antennomeres even paler brown; pronotum yellow, with punctate lateral striae and basal furrows slightly darkened; elytra yellow, with darkened punctures and, in some specimens, small, sparse irregular pale brown patches on disc (Fig. 3A). Pronotal lateral striae C-shaped, with large deeply impressed punctures; basal furrows of pronotum deeply impressed; pronotal punctation very fine (Fig. 3B). Basal pro- and mesotarsomeres in male distinctly enlarged, subtriangular (Fig. 3A). Median lobe of aedeagus (Fig. 3C) distinctly sinuate laterally in ventral view; as wide basally as distally; apex subtriangular, widely obtuse and rounded laterally with small ventrolateral bulges; ventral surface with two carinae delimiting a wide sulcus, and a narrow distal sulcus in the apical third; ventrolateral surface wrinkled; dorsal ligula short, formed by two subtruncate basal lobes and two shorter subtriangular apical lobes; in lateral view, median lobe distinctly bent down, and sinuate apically. Spermatheca (Fig. 3D) with basal part subcylindrical, relatively slender, distinctly curved; distal part abruptly bent, curved to the apex, with a very short appendix; distal part clearly shorter than half the length of the basal part; ductus basally inserted, elongate, uncoiled but with wide loops.

Biometrics. Males (n = 5; mean ± standard deviation, range): LE = 3.99 ± 0.14 mm (3.75 ≤ LE ≤ 4.10 mm); WE = 2.90 ± 0.12 mm (2.70 ≤ WE ≤ 3.00 mm); LP = 1.20 ± 0.03 mm (1.15 ≤ LP ≤ 1.23 mm); WP = 2.32 ± 0.08 mm (2.20 ≤ WP ≤ 2.40 mm); LAN = 2.40 ± 0.10 mm (2.25 ≤ LAN ≤ 2.50 mm); LAED = 2.18 ± 0.05 mm (2.13 ≤ LAED ≤ 2.25 mm); LB = 5.12 ± 0.08 mm (5.00 ≤ LB ≤ 5.20 mm); LE/LP = 3.33 ± 0.07 (3.26 ≤ LE/LP ≤ 3.42); WE/WP = 1.25 ± 0.02 (1.23 ≤ WE/WP ≤ 1.28); WP/LP = 1.94 ± 0.05 (1.88 ≤ WP/LP ≤ 2.00); WE/LE = 0.73 ± 0.01 (0.72 ≤ WE/LE ≤ 0.73); LAN/LB = 0.47 ± 0.01 (0.45 ≤ LAN/LB ≤ 0.49); LE/LAED = 1.83 ± 0.06 (1.76 ≤ LE/LAED ≤ 1.93). **Females** (n = 3; mean ± standard deviation; range): LE = 4.33 ± 0.12 mm (4.20 ≤ LE ≤ 4.40 mm); WE = 3.24 ± 0.04 mm (3.20 ≤ WE ≤ 3.28 mm); LP = 1.21 ± 0.01 mm (1.20 ≤ LP ≤ 1.23 mm); WP = 2.48 ± 0.04 mm (2.43 ≤ WP ≤ 2.50 mm); LAN = 2.25 ± 0.05 mm (2.20 ≤ LAN ≤ 2.30 mm); LSP = 0.78 ± 0.03 mm (0.75 ≤ LSP ≤ 0.80 mm); LB = 5.58 ± 0.20 mm (5.40 ≤ LB ≤ 5.80 mm); LE/LP = 3.59 ± 0.14 (3.43 ≤ LE/LP ≤ 3.67); WE/WP = 1.31 ± 0.04 (1.28 ≤ WE/WP ≤ 1.35); WP/LP = 2.05 ± 0.03 (2.02 ≤ WP/LP ≤ 2.08); WE/LE = 0.75 ± 0.01 (0.74 ≤ WE/LE ≤ 0.76); LAN/LB = 0.40 ± 0.02 (0.39 ≤ LAN/LB ≤ 0.43); LE/LSP = 5.53 ± 0.06 (5.50 ≤ LE/LSP ≤ 5.60).

Distribution. Republic of South Africa (WCape) (Fig. 6). Chorotype: Southern-Western Afrotropical (SWA).

Ecological notes. Habitat and host plants unknown. Adults collected in January, April and December.

Calotheca parvula **(Weise, 1908)**

Figs 4A–D, 6

Eutheca parvula Weise, 1908: 151
Calotheca parvula (Weise): Biondi et al. 2017: 124 (pars)

Type material examined. ***Lectotype*** **♀:** Brit. SW-Afrika [RSA, NCape], Kl. Namaland, Steinkopf [29°15'30"S, 17°43'41"E], vii.[19]04, L. Schultze S./N, 718 (M. Biondi des. 2017) (ZMHB). ***Paralectotypes*:** Same data as lectotype, 1♀ (NHMUK).

Additional material examined. Republic of South Africa: [ECape], Aliwal N.[orth], [30°41'56"S, 26°43'22"E], 13.v.[19]79, on *Rhus* sp., RSA 332, L. Viljoen

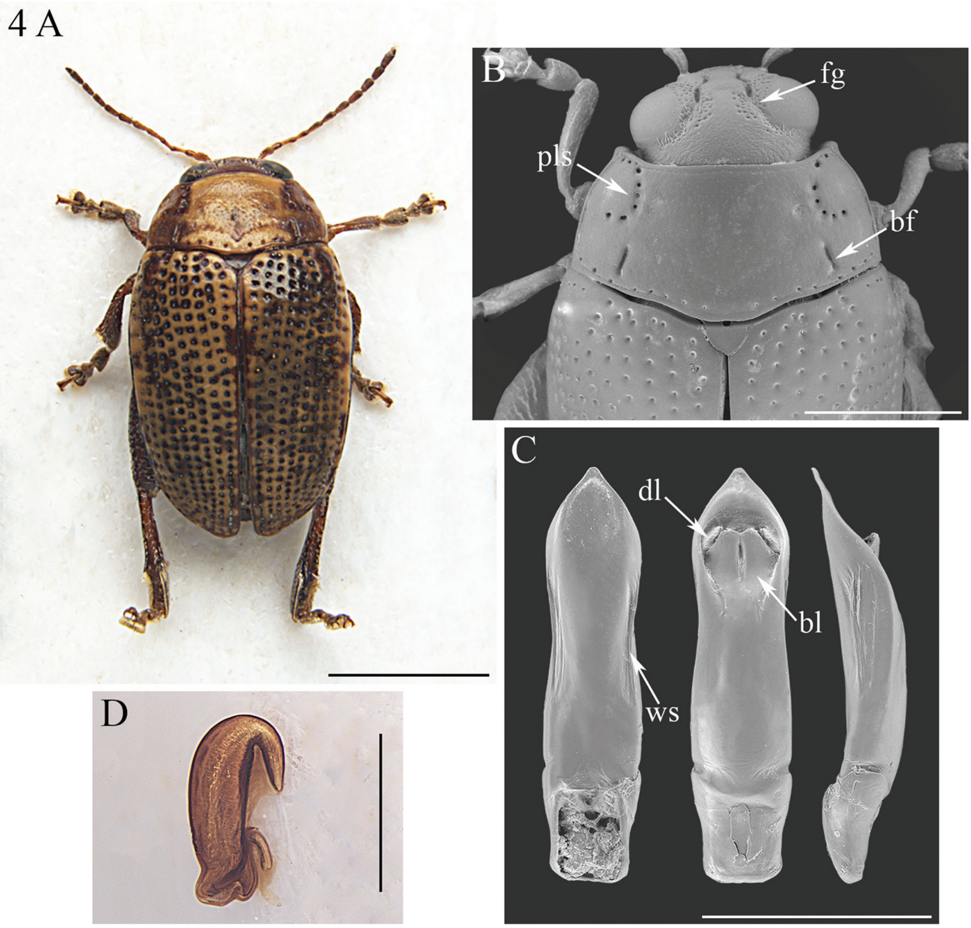

Figure 4. *Calotheca parvula* (Weise, 1908) **A** habitus ♂ (RSA: NCape, Nieuwoudtville Botanic Gardens) **B** head, pronotum, and basal part of elytra, ♂ (RSA: WCape, Bidouw Valley) **C** median lobe of aedeagus, from left to right in ventral, dorsal, and lateral view (RSA: WCape, Karoo National Park) **D** spermatheca (RSA: NCape, Steinkopf). Abbreviations: bf = basal furrow; bl = basal lobe of dorsa ligula; dl = distal lobe of dorsa ligula; fg = frontal groove; pls = punctate lateral stria; ws = wrinkled surface. Scale bars: 2 mm (**A**); 1 mm (**B, C**); 0.5 mm (**D**).

leg., 2 specimens (SANC); C.P. [NCape], Nieuwoudtville Botanic Gardens, 31°22'S, 19°07'E, 9.ix.1987, C.D. Eardley leg., 1 specimen (SANC); [NCape], Nieuwoudtville, 700–750 m [31°22'39"S, 19°06'08"E], fynbos & grassland, on *Rhus* sp., 15.ix.1994, P. Audisio, M. Biondi, M.A. Bologna leg., 1 specimen (BAQ); KP. [NCape], Petrusville [30°05'11"S, 24°39'15"E], xii.1960, AcCol.40, J. v. Vuuren leg., 4 specimens (SANC); N&W Cape [NCape], route Kliprand-Loeriesfontein [30°48'41"S, 19°00'31"E], 31.x.1999, M. Snizek leg., 1 specimen (BAQ); C.P. [WCape], Clanwilliam District, Bidouw Valley, 32°08'S, 19°14'E, 7.ix.1987, C.D. Eardley leg., 2 specimens (SANC); Cape Province [WCape], Karoo National Park, 12–14.xi.1993, 32°19'S, 22°30'E, J.

Deckert leg., 1 specimen (ZMHB); [WCape], Bushmanld., Jackals Water, [29°49'00"S, 22°33'00"E], x.1911, Lightfoot leg., 4 specimens (SANC); South-West Afric, Aus. 8–30.xi.1929, R.E. Turner leg., 1930-113, 1 specimen (NHMUK). Namibia: [Karas], Zebrafontein, ca 30 km NNE RoshPinah, 27°45'S, 16°53'E, 2–6.iv.2002, E. Holm & H. Gebhardt leg., 1 specimen (SANC).

Taxonomic remarks. Body size in both males and females smaller compared to the other species in the *C. parvula* group, with the exception of males of *C. danielssoni* sp. nov. Head, antennae and legs brown; tibiae, tarsi and basal antennomeres slightly paler in some specimens; pronotum yellow, with wide dark reddish-brown patches laterally, at least on punctate lateral striae and basal furrows; elytra dirty-yellow, with distinctly darkened punctures and small sparse irregular patches on the disc, one of which is larger and always present on the suture at the end of the scutellar row of punctures (Fig. 4A). Pronotal lateral striae C-shaped, with punctures larger and more deeply impressed than on the elytra; basal furrows of pronotum deeply impressed; pronotal surface apparently rough, micropunctate, with additional small irregular punctation; a shallow but evident v-shaped wrinkle medially, near the pronotal base; evident punctation lining basal margin (Fig. 4A, B). Basal pro- and mesotarsomeres in male moderately enlarged (Fig. 4A). Median lobe of aedeagus (Fig. 4C) distinctly sinuate laterally in ventral view; narrowing gradually apically to terminate in an acute median tooth; surface smooth, slightly wrinkled ventrolaterally; dorsal ligula short, formed by two wider truncate basal lobes which taper apically, and two thinner lateral distal lobes; in lateral view, median lobe moderately bent down, with a slightly sinuate apex. Spermatheca (Fig. 4D) with basal part subcylindrical, generally slender, slightly curved; distal part clearly curved, slightly narrower and generally straight or externally oriented apically, with a very short appendix; distal part shorter than half the length of the basal part; ductus basally inserted, moderately elongate, with a single coil at most.

Biometrics. Males ($n = 7$; mean ± standard deviation, range): LE = 3.65 ± 0.15 mm ($3.45 \leq$ LE ≤ 3.90 mm); WE = 2.57 ± 0.13 mm ($2.40 \leq$ WE ≤ 2.80 mm); LP = 1.08 ± 0.07 mm ($1.00 \leq$ LP ≤ 1.20 mm); WP = 2.10 ± 0.09 mm ($2.00 \leq$ WP ≤ 2.25 mm); LAN = 2.00 ± 0.11 mm ($1.90 \leq$ LAN ≤ 2.10 mm); LAED = 1.81 ± 0.07 mm ($1.68 \leq$ LAED ≤ 1.88 mm); LB = 4.61 ± 0.22 mm ($4.33 \leq$ LB ≤ 5.00 mm); LE/LP = 3.38 ± 0.12 ($3.20 \leq$ LE/LP ≤ 3.55); WE/WP = 1.22 ± 0.02 ($1.20 \leq$ WE/WP ≤ 1.25); WP/LP = 1.94 ± 0.05 ($1.88 \leq$ WP/LP ≤ 2.00); WE/LE = 0.70 ± 0.02 ($0.68 \leq$ WE/LE ≤ 0.73); LAN/LB = 0.43 ± 0.02 ($0.41 \leq$ LAN/LB ≤ 0.47); LE/LAED = 2.02 ± 0.06 ($1.92 \leq$ LE/LAED ≤ 2.08). **Females** ($n = 10$; mean ± standard deviation; range): LE = 3.80 ± 0.24 mm ($3.30 \leq$ LE ≤ 4.15 mm); WE = 2.73 ± 0.21 mm ($2.40 \leq$ WE ≤ 3.08 mm); LP = 1.06 ± 0.08 mm ($0.95 \leq$ LP ≤ 1.20 mm); WP = 2.19 ± 0.15 mm ($1.95 \leq$ WP ≤ 2.45 mm); LAN = 1.87 ± 0.12 mm ($1.75 \leq$ LAN ≤ 2.10 mm); LSP = 0.70 ± 0.05 mm ($0.63 \leq$ LSP ≤ 0.75 mm); LB = 4.79 ± 0.34 mm ($4.10 \leq$ LB ≤ 5.25 mm); LE/LP = 3.59 ± 0.10 ($3.46 \leq$ LE/LP ≤ 3.75); WE/WP = 1.25 ± 0.03 ($1.19 \leq$ WE/WP ≤ 1.29); WP/LP = 2.07 ± 0.05 ($2.00 \leq$ WP/LP ≤ 2.15); WE/LE = 0.72 ± 0.02 ($0.68 \leq$ WE/LE ≤ 0.74); LAN/LB = 0.39 ± 0.03 ($0.36 \leq$ LAN/LB ≤ 0.43); LE/LSP = 5.46 ± 0.38 ($4.89 \leq$ LE/LSP ≤ 5.92).

Distribution. Namibia (Karas); Republic of South Africa (ECape, NCape, WCape) (Fig. 6).

Chorotype: Southern-Western Afrotropical (SWA).

Ecological notes. Collected between 700–750 m a.s.l. in fynbos vegetation and grassland, on *Searsia* spp. [= *Rhus* pars., cf. Moffett (2007)] (Anacardiaceae). Adults active in April, May, July, September, October, November, December.

Calotheca prinslooi sp. nov.

http://zoobank.org/0870B572-50C3-409A-954E-554354D4AB7E
Figs 5A–D, 6

Calotheca parvula (Weise): Biondi et al. 2017: 124 (pars)
Calotheca pallida (Bryant): Biondi et al. 2017: 123 (pars)

Type material. ***Holotype*** ♂**:** South Africa [RSA], Western Cape, Swellendam (N env.), 150 m, near Marloth Nat. Res., 34°00.607'S, 20°25.874'E [34°00'35"S, 20°25'57"E], 3–11.xii.2007, Martin Řiha leg. (SANC). ***Paratypes*****:** Republic of South Africa: CP [ECape], Groendal Dam nr Uitenhage, 33°42'S, 25°15'E, 10.iii.1983, W. Breytenbach leg., 2♂ and 1♀ (SANC); ECape, Willow River Farm, 33°32'S, 24°49'E, collected from *Rhus pallens* (Anacardiaceae), 29.xi.1988, E. Grobbelaar leg., 10♂ and 10♀ (SANC); (S), ECape, 175 m, -33.0659, 27.2098 [33°03'57"S, 27°12'35"E], N2 Rd side 20 km N of Peddie, karoo vegetation, 18.xi.2013, M. Wanat leg., 1♀ (UWCP); C.P. [ECape], Grahamstown [33°19'24"S, 26°31'48"E], i.1979, C. Kok & S.J. van Tonder leg., 1♀ (SANC); [ECape], 10 km South of Addo, 100 m, 35°46'S, 25°45'E [33°36'58"S, 25°42'41"E], xi.1988, E. Colonnelli leg., 1♀ (BAQ); [ECape], 16 m North Steytlerville [33°17'40"S, 24°22'20"E], 24.x.[19]64, A.L. Capener leg., 2♀ (SANC); ECape, Hankey, 33°50'S, 24°53'E, R. Stals leg., 2♀ (SANC); C.P. [ECape], Jeffreys Bay, 34°02'S, 24°50'E, 22.xi.1983, G.L. Prinsloo & N.C. Grobbelaar leg., 1♀ (SANC); ECape, Mondhoek, 12 km NNE of Jeffreys Bay, 33°56.5'S, 24°59'E, 02.i.1997, R. Stals leg., 1♀ (SANC); [ECape], road Grahamstown to Alexandria, 350 m, 33°23.97S, 26°28.43E [33°23'58"S, 26°28'26"E], 3.v.2005, P. Audisio & E. Colonnelli leg., 1♀ (BAQ); ECape, Zuurberg Nature Reserve, 900 m, 33°16'S, 25°45'E, 28.xi.1988, adults collected from *Rhus dentata* (Anacardiaceae), E. Grobbelaar leg., 1♀ (SANC); [WCape], same data as the holotype, 2♂ and 1♀ (BAQ); S. Cape [WCape], Uniondale, 33°39'S, 23°07'E, 19.i.1979, S.J. van Tonder & C. Kok leg., 1♂ (SANC); [WCape], Agulhas [34°48'59"S, 20°00'55"E], 8.i.[19]71, A. Prinsloo leg., 1♂ and 2♀ (SANC); ditto, D. Wessels leg., 2♂ and 1♀ (SANC); Western Cape, W of Calitzdorp-Huisrivierspas [33°30'50"S, 21°35'38"E], m 662, 19.iv.1998, S. Zoia & F. Polese leg., 1♀ (BAQ); [WCape], Malagas [34°18'S, 20°34'59"E], 29.ii.1932, R.E. Turner leg., 1♀ (NHMUK); [WCape], Bontebok National Park, 34°04'S, 20°27'E, 20.iv.1995, U. Göllner leg., 3♀ (BAQ); W Cape, 530 m, -33.7127, 22.2981 [33°42'54"S, 22°17'45"E], Klein Karoo, N12 Rd, 15 km S Oudtshoorn, roadside karoo vegetation, 30.xi.2013, M. Wanat leg., 2♀ (UWCP).

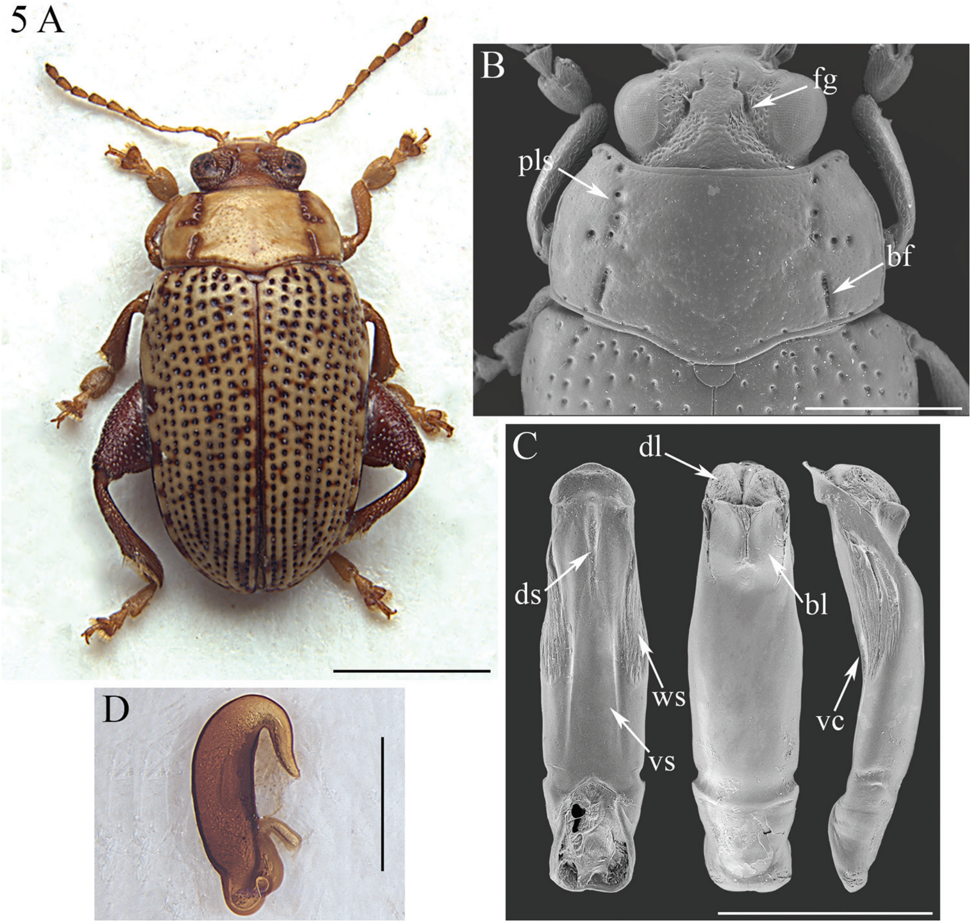

Figure 5. *Calotheca prinslooi* sp. nov. **A** habitus, ♂ (holotype) **B** head, pronotum, and basal part of elytra, ♂ (RSA: ECape, Willow River Farm) **C** median lobe of aedeagus, from left to right in ventral, dorsal, and lateral view (RSA: WCape, Swellendam) **D** spermatheca (ECape, Willow River Farm). Abbreviations: bf = basal furrow; bl = basal lobe of dorsa ligula; dl = distal lobe of dorsa ligula; ds = distal sulcus; fg = frontal groove; pls = punctate lateral stria; vc = ventral carina; vs = ventral sulcus; ws = wrinkled surface. Scale bars: 2 mm (**A**); 1 mm (**C, B**); 0.5 mm (**D**).

Diagnosis. *Calotheca prinslooi* sp. nov. is very similar in shape, size, sculpture and colour to *C. oberprieleri* sp. nov. and *C. pallida*. Males are easily distinguishable by: the first pro- and mesotarsomeres which are distinctly enlarged and rounded (less enlarged and/or subtriangular in *C. oberprieleri* sp. nov. and *C. pallida*) (Figs 2A, 3A, 5A); the aedeagus in ventral view, distinctly wider medially, wider basally than apically, and tapering slightly towards the bluntly rounded apex (sinuate, narrow in the apical third, wider basally than apically in *C. oberprieleri* sp. nov.; sinuate, narrowing medially, as wide basally as apically in *C. pallida*), and ventral surface with two basally divergent carinae (ventral surface flat in *C. oberprieleri* sp. nov.; ventral carinae subparallel in *C. pallida*) (Figs 2C, 3C, 5C). Females can be distinguished from *C. oberprieleri* sp. nov.

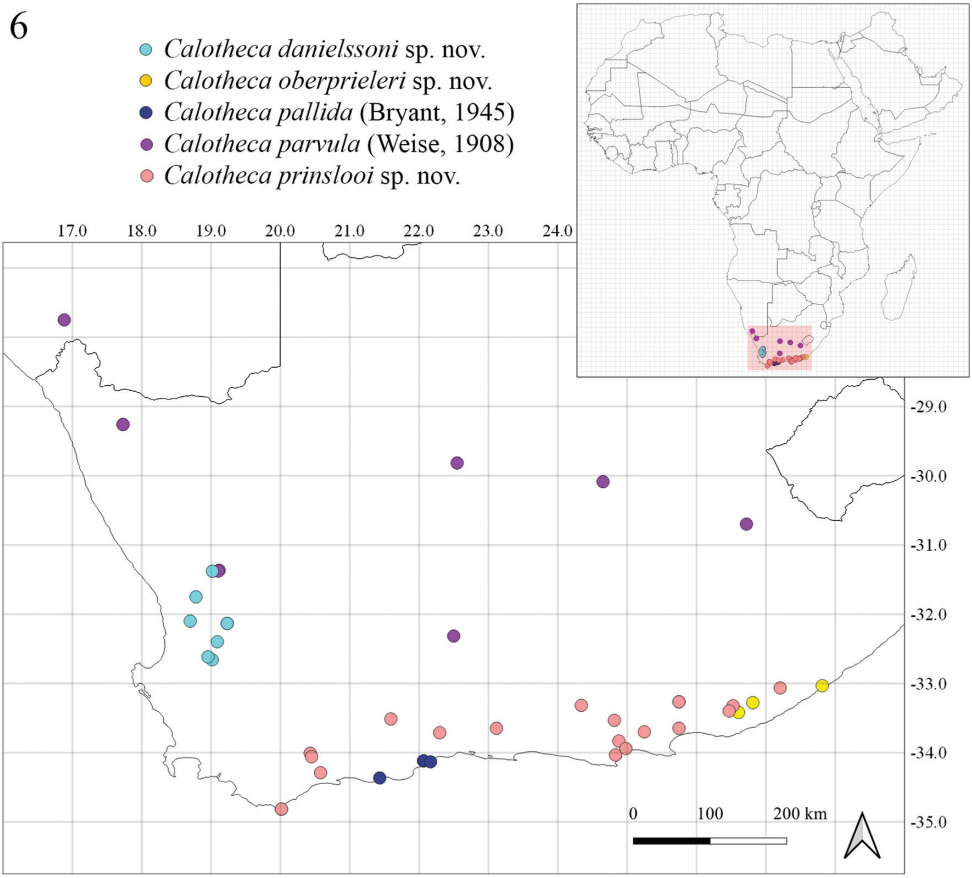

Figure 6. Distribution of *Calotheca parvula* species group.

and *C. pallida* mainly by the shape of the spermatheca, which is quite variable, but never reniform basally as in *C. oberprieleri* sp. nov., nor with apical part abruptly bent and curved to the apex as in *C. pallida* (Figs 2D, 3D, 5D).

Description of the holotype (♂). Body elongate-elliptical in dorsal view (Fig. 5A), moderately convex in lateral view; total length of body (LB = 5.50 mm); maximum pronotal width near base (WP = 2.25 mm); maximum width of elytra at basal third (WE = 2.80 mm). Head, apical antennomeres and legs pale brown; frons, labrum, and first antennomeres slightly paler brown; hind femora, hind and middle tibiae distinctly darker; pronotum yellow, punctate lateral striae and basal furrows distinctly darkened; elytra yellow, with darkened punctures, and small, irregular, sparse reddish-brown patches, larger on the last interstria. Head (cf. Fig. 5B) with wrinkled and micropunctate surface, with some punctures on frons; several setiferous punctures between medial ocular margin and frontal grooves, and near the dorsal part of frontal grooves; frontal grooves very deeply impressed more so anteriorly, sinuate, extending from dorsal ocular margin to interantennal space; interantennal space wide, about

1.5 times the length of the first antennomere; eyes elongate-ovate; dorsal interocular space wider than 1.5 times the transversal width of eye; antennae slightly shorter than half the body length (LAN = 2.50 mm; LAN/LB = 0.45; LA: 100:50:71:79:86: 86:86:86:82:79:100). Pronotum (cf. Fig. 5B) barely convex, slightly sub-trapezoidal, distinctly transverse (LP = 1.20 mm; WP/LP = 1.88), with distinctly rounded sides; surface almost smooth, finely microreticulate and sparsely micropunctate, with additional small sparse punctation; pronotal lateral striae C-shaped, with large, deeply impressed punctures; basal furrows of pronotum deeply impressed; basal and apical margins distinctly bordered but not raised; lateral margins barely expanded but visible in dorsal view; anterior angles moderately prominent and pointed; posterior angles widely obtuse. Scutellum sub-triangular, apically rounded. Elytra (Fig. 5A, cf. 5B) moderately elongate and convex (LE = 4.08 mm; WE/LE = 0.69; LE/LP = 3.40), slightly sinuate laterally, jointly rounded apically; lateral margin narrow, barely visible in dorsal view; elytral punctation arranged in single regular rows, punctures deeply impressed; interstriae with finely microreticulate and micropunctate surface; last interstria carinate; humeral calli barely raised. Macropterous. Legs with basal pro- and mesotarsomeres distinctly enlarged, sub-rounded (Fig. 5A). Tarsal claws simple. Underside brown; apical abdominal ventrite without preapical sculpture or impressions. Median lobe of aedeagus (cf. Fig. 5C) (LAED = 2.05 mm; LE/LAED = 1.99) with greatest width medially, wider basally than apically, and tapering towards the apex; apex bluntly rounded with small ventrolateral bulges; ventral surface with two basally divergent carinae delimiting a wide sulcus, which becomes narrower and shallower distally; narrow distal sulcus in the apical third; ventrolateral surface widely wrinkled; dorsal ligula short, formed by two subtruncate basal lobes and two shorter apical lobes; in lateral view, median lobe distinctly bent down to the apex, and distinctly sinuate on the ventral apical surface.

Variability. Males (n = 10; mean ± standard deviation, range): LE = 4.03 ± 0.20 mm (3.50 ≤ LE ≤ 4.25 mm); WE = 2.89 ± 0.17 mm (2.80 ≤ WE ≤ 3.15 mm); LP = 1.23 ± 0.06 mm (1.10 ≤ LP ≤ 1.30 mm); WP = 2.33 ± 0.12 mm (2.05 ≤ WP ≤ 2.45 mm); LAN = 2.49 ± 0.11 mm (2.25 ≤ LAN ≤ 2.65 mm); LAED = 2.10 ± 0.07 mm (1.98 ≤ LAED ≤ 2.25 mm); LB = 5.52 ± 0.32 mm (4.85 ≤ LB ≤ 6.00 mm); LE/LP = 3.27 ± 0.09 (3.10 ≤ LE/LP ≤ 3.40); WE/WP = 1.24 ± 0.03 (1.21 ≤ WE/WP ≤ 1.29); WP/LP = 1.89 ± 0.03 (1.84 ≤ WP/LP ≤ 1.92); WE/LE = 0.72 ± 0.02 (0.69 ≤ WE/LE ≤ 0.75); LAN/LB = 0.45 ± 0.02 (0.42 ≤ LAN/LB ≤ 0.47); LE/LAED = 1.92 ± 0.06 (1.77 ≤ LE/LAED ≤ 1.98). **Females** (n = 10; mean ± standard deviation; range): LE = 4.11 ± 0.15 mm (3.90 ≤ LE ≤ 4.30 mm); WE = 3.02 ± 0.10 mm (2.90 ≤ WE ≤ 3.28 mm); LP = 1.15 ± 0.04 mm (1.10 ≤ LP ≤ 1.23 mm); WP = 2.36 ± 0.08 mm (2.20 ≤ WP ≤ 2.45 mm); LAN = 2.20 ± 0.08 mm (2.05 ≤ LAN ≤ 2.35 mm); LSP = 0.76 ± 0.04 mm (0.70 ≤ LSP ≤ 0.80 mm); LB = 5.53 ± 0.24 mm (5.25 ≤ LB ≤ 5.95 mm); LE/LP = 3.57 ± 0.15 (3.27 ≤ LE/LP ≤ 3.74); WE/WP = 1.28 ± 0.03 (1.25 ≤ WE/WP ≤ 1.34); WP/LP = 2.04 ± 0.05 (1.98 ≤ WP/LP ≤ 2.13); WE/LE = 0.74 ± 0.02 (0.70 ≤ WE/LE ≤ 0.77); LAN/LB = 0.40 ± 0.01 (0.38 ≤ LAN/LB ≤ 0.42); LE/LSP = 5.44 ± 0.28 (4.88 ≤ LE/LSP ≤ 5.79).

Paratypes similar in shape, sculpture and colour to the holotype. Some specimens either slightly paler or darker, and/or with surface sculpture on head slightly variable. Female with basal pro- and mesotarsomeres less enlarged than in male. Spermatheca (Fig. 5D) quite variable, basal part broadly subcylindrical or subconical, slightly thickset to slender, straight or barely curved; distal part generally softly bent, distinctly narrower and often externally oriented apically, with a very short appendix; distal part shorter than half the length of the basal part; ductus basally inserted, short to moderately elongate, generally with a single coil, or with a pair of irregular loops at most.

Etymology. The specific epithet is a noun in the genitive case after Godfried L. Prinsloo (Republic of South Africa, Pretoria), one of its collectors.

Distribution. Republic of South Africa (ECape, WCape) (Fig. 6). Chorotype: Southern-Western Afrotropical (SWA).

Ecological notes. Collected from 100–900 m a.s.l., in karoo vegetation, on *Searsia pallens* and *S. dentata* [= *Rhus* pars, cf. Moffett (2007)] (Anacardiaceae). Adults active in January, February, March, April, May, October, November, December.

Discussion

Calotheca danielssoni sp. nov., *C. oberprieleri* sp. nov., *C. pallida*, *C. parvula*, and *C. prinslooi* sp. nov. are attributed to the same species group because they share the following characteristics (Figs 1–5): body elongate-elliptical, small to medium sized (4.05 ≤ LB ≤ 6.20 mm); integument from yellow to pale brown, generally with darker reddish-brown to dark brown patches on the pronotum and/or elytra; pronotal lateral striae C-shaped on disc, comprised of large deeply impressed punctures; basal furrows of pronotum deeply impressed; pronotal surface relatively smooth, or at most with shallow lateral depressions and small punctures; elytral punctures large, deeply impressed, and individually darkened – striae not darkened; and simple tarsal claws. Species also share a similar spermathecal morphology (Figs 1E, 2D, 3D, 4D, 5D): basal part elongate and broadly sub-cylindrical; distal part distinctly bent, narrower, and shorter than half of the basal part, with a very small appendix; ductus apically inserted, thickset, moderately to distinctly elongate, generally with some loops and/or a single coil. The median lobe of the aedeagus (Figs 1B, C, 2C, 3C, 4C, 5C) reveals primary affinities among *C. danielssoni* sp. nov., *C. oberprieleri* sp. nov., *C. pallida* and *C. prinslooi* sp. nov., due to: a narrow ventral medial sulcus in apical third; apex bearing small ventrolateral bulges (apex more prominent laterally in specimens of *C. danielssoni* sp. nov.); dorsal ligula formed by two basal and two distal lobes; paired ventral carinae delimiting a wide ventral sulcus (present in *C. danielssoni* sp. nov., *C. pallida* and *C. prinslooi* sp. nov.). The group occurs in the southernmost part of the distribution range for the genus, precisely, the Republic of South Africa and Namibia (Fig. 6), which host respectively 22 and 6 *Calotheca* species based on the present contribution and the previously published data (Biondi et al. 2017). It is associated with the plant genus *Searsia* (Anacardiaceae) in fynbos, karoo, and grassland vegetation. Data on host plants thus confirm the association of the genus with the plant family Anacardiaceae.

Key to species of the *Calotheca parvula* group

1 Elytral punctures larger and more deeply impressed than those of the pronotal striae (Fig. 1A, D). Median lobe of aedeagus with apical part distinctly wider than the remaining length; dorsal ligula with clearly truncate basal lobes, about as long as, or slightly longer than, distal lobes (Fig. 1B, C) .... ***Calotheca danielssoni* sp. nov.**

– Elytral punctures as large as, or smaller than, those of the pronotal striae (Figs 2A, B, 3A, B, 4A, B, 5A, B). Median lobe of aedeagus with apical part as wide as, or narrower than, the remaining length; dorsal ligula with subtruncate basal lobes, distinctly longer than apical lobes (Figs 2C, 3C, 4C, 5C) **2**

2 Basal pro- and mesotarsomeres in male moderately enlarged (Fig. 4A). Median lobe of aedeagus (Fig. 4C) narrowing gradually apically to terminate in an acute median tooth; distal lobes of dorsal ligula thinner and more lateral. Body size smaller (LB generally < 5.00 mm in males, and < 5.25 mm in females). Integuments generally darker; pronotum with more evident v-shaped wrinkle near the base, and more evident punctation lining basal margin; a larger elytral patch always present on the suture at the end of the scutellar row of punctures (Fig. 4A)... ***C. parvula* (Weise, 1908)**

– Basal pro- and mesotarsomeres in male distinctly enlarged (Figs 2A, 3A, 5A). Median lobe of aedeagus with apex subrounded or obtuse subtriangular, rounded laterally, with small ventrolateral bulges; distal lobes of dorsal ligula thickset and apical (Figs 2C, 3C, 5C). Integuments generally paler; pronotum with barely visible v-shaped wrinkle near the base, and less evident punctation lining basal margin; elytral patch on the suture at the end of the scutellar row of punctures absent or as large as other elytral patches (Figs 2A, 3A, 5A)..**3**

3 Surface of median lobe of aedeagus flat ventrally (Fig. 2C). Spermatheca subreniform and thickset basally (Fig. 2D). Pronotal margins more rounded laterally (Fig. 2B)... ***C. oberprieleri* sp. nov.**

– Surface of median lobe of aedeagus with ventral carinae delimiting a deep sulcus (Figs 3C, 5C). Spermatheca broadly subcylindrical and more slender basally (Figs 3D, 5D). Pronotal margins less rounded or more distinctly curved at apical third (Figs 3B, 5B) **4**

4 First pro- and mesotarsomeres in male distinctly enlarged and rounded (Fig. 5A). Median lobe of aedeagus in ventral view, distinctly wider medially, wider basally than apically, and tapering slightly towards the apex (Fig. 5C). Spermatheca never with apical part abruptly bent and curved up to the apex (Fig. 5D)... ***C. prinslooi* sp. nov.**

– First pro- and mesotarsomeres in male distinctly enlarged and subtriangular (Fig. 3A). Median lobe of aedeagus in ventral view, narrowing medially, as wide basally as apically. Spermatheca with apical part abruptly bent and curved up to the apex (Fig. 3D) .... ***C. pallida* (Bryant, 1945)**

Conclusion

C. danielssoni sp. nov., *C. oberprieleri* sp. nov., *C. pallida*, *C. parvula*, and *C. prinslooi* sp. nov. are here attributed to the *C. parvula* species group based on their external morphology and characters of the median lobe of the aedeagus and spermatheca. Species can easily be identified by the shape of the median lobe of the aedeagus. Spermathecal characters are generally not reliable for identification, because intraspecific variability can encompass interspecific variability. However, the combination of some unique external characters and spermathecal features may be useful to also distinguish females (see Key to species).

The genus *Calotheca* currently includes 32 species. However, new material under examination reveals the occurrence of several undetermined species, along with a high degree of variability within the already known species (Biondi, unpublished data). The study of that material and the revision of the described species will provide a more in-depth insight into the contribution that *Calotheca* gives to the African biodiversity.

Acknowledgements

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RESEARCH ARTICLE

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Description of the female of *Syrittosyrphus opacea* Hull, 1944 (Diptera, Syrphidae, Eristalinae) with additional notes on the genus

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Abstract

The taxonomy of Syrphidae is far from being complete in the Afrotropical Region and many species have been described from a single sex only. One of these is the enigmatic monotypic genus *Syrittosyrphus* Hull, 1944, of which, so far, only the male of *Syrittosyrphus opacea* Hull, 1944 was described from the Eastern Cape Province in South Africa. Here, we re-describe the male and describe the female. We summarise all known distribution records from South Africa (Eastern Cape, KwaZulu-Natal and Limpopo Provinces) and Zimbabwe (Vumba), of which several are new. We also provide notes on the species' ecology.

Keywords

Afrotropical Region, flower fly, hoverfly, identification

Introduction

The Afrotropical Region is relatively poor in genera and species of hoverflies or flower flies (Diptera: Syrphidae) (Ssymank et al., in press). Nevertheless, it harbours a number of enigmatic, endemic hoverfly genera. A case in point is the monotypic genus *Syrittosyrphus* Hull. *Syrittosyrphus* is a genus within the subfamily Eristalinae and is assumed to be part of the tribe Milesiini although its phylogenetic relationship to other Milesiini remains unknown (see Thompson 1972, 1974; Hippa 1990). Hippa (1990) suggested that the closest relatives include *Milesia* Latreille, *Pterallastes* Loew and *Palumbia* Rondani (Hippa 1990), while Hull (1944) suggested that the genus was related to the genus *Korinchia* Edwards. Phylogenetic analysis of anchored hybrid enrichment molecular data seems to confirm that the sister group of *Syrittosyrphus* is *Korinchia* + (*Palumbia* + *Pterallastes*) which do not have species in the Afrotropics (Moran et al., unpublished data).

Recently, a complete key to the genera of the Afrotropical Region was compiled (Ssymank et al. in press). Older keys to the Afrotropical genera, such as Curran (1927) and Vockeroth (1969) were incomplete and none included the genus *Syrittosyrphus* Hull. This genus is monotypic and endemic to southern Africa and its single species *Syrittosyrphus opacea* Hull, 1944 was described on a single male from Somerset East (Cape Province, South Africa) and deposited at the Natural History Museum UK (NHMUK, formerly the British Museum of Natural History – BMNH). The description of the species is brief and lacks illustrations. Later, Smith and Vockeroth (1980) and Dirickx (1998) list the holotype in their catalogues. Hull (1949) illustrated *S. opacea*, while Hippa (1990) illustrated the head, metathoracic spiracle, male hind leg and male and female genitalia. Hippa (1990), in his study on the genus *Milesia* Latreille, studied material from a variety of museums, including the two holdings which, at that time, had *S. opacea* in their collections, i.e. NHMUK and the KwaZulu-Natal Museum (KZNM, Pietermaritzburg, South Africa; historic acronym: NMSA). It is unclear whether Hippa illustrated the holotype from NHMUK (the only specimen in the collection) or a male from the KZNM. The female illustrated by Hippa (1990) must be one of the females in the collection at KZNM, but apart from the illustration of the female genitalia, morphological details of the female are lacking. Pictures of the male lateral and dorsal habitus and detail of the scutum, taken by X. Mengual (Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany) are provided in http://syrphidae.myspecies.info/taxonomy/term/768.

Whittington (1998) studied the D. Cookson collection from Vumba in the Eastern Highlands of Zimbabwe which comprises one male and one female of *S. opacea* and which are stored at the KZNM. Although the female of *S. opacea* was obviously known to both Hippa (1990) and Whittington (1998), so far, a description of the female is lacking and the generic diagnosis is based on morphological characters of the male only. Here, we describe, for the first time, the female of *S. opacea*. Since the female differs in some morphological characters from the male, a description of the female is important to properly diagnose the genus and identify the species. This also allowed us to include the genus in the key to the genera of Afrotropical Syrphidae (Ssymank et al., in press).

Material and methods

Study material was obtained from the following museums and personal collections:

ASPC Axel Ssymank, personal collection, Wachtberg, Germany;
KMMA Koninklijk Museum voor Midden Afrika, Tervuren, Belgium;

NHMUK Natural History Museum UK, London, UK;
NMSA KwaZulu-Natal Museum, Pietermaritzburg, South Africa;
WBPC Werner Barkemeyer, personal collection, Flensburg, Germany.

Morphological terminology followed Cumming and Wood (2017), except for the segments of the first, second and third pair of legs, for which we have used the prefix pro-, meso- and meta-, respectively. We refer to pollinosity as microtrichia in the form of dust-like pruinescence (Cumming and Wood 2017, p. 89). Body length and wing length were measured using a reticule in a Zeiss SV11 stereomicroscope. Digital images were obtained using the set-up as outlined in Brecko et al. (2014). Stacking was done using the software ZERENE STACKER (www.zerenesystems.com/cms/home). Genitalia were dissected using forceps and soaked for 36 hours in a cold 10% potassium hydroxide (KOH) solution, after which they were transferred to acetic acid for 24 hours. Afterwards, they were transferred to glycerine. Digital images were taken with a Leica MZ16 microscope using LEICA APPLICATION SUITE (LAS) automontage software (version 3.8). From the specimen voucher AB59880784 (KMMA), we obtained a DNA barcode (GenBank accession number MW698743). Procedures for DNA barcoding followed Jordaens et al. (2015).

Taxonomy and systematics

Genus *Syrittosyrphus* Hull

Syrittosyrphus Hull, 1944: 203. Type species: *Syrittosyrphus opacea* Hull, 1944, (by monotypy).
Syrittosyrphus opacea Hull-Smith and Vockeroth (1980): 508; Dirickx (1998): 137; Whittington (1998), 39: 193; Whittington (2003), 10: 603.

Differential diagnosis. The genus differs from any other genus of hoverflies in the following combination of characters: scutellum with deep rim and fringe of pile ventrally, metasternum pilose, coxae with long pile, all sternites with long pile, wing cell r_1 widely open, wing vein R_{4+5} deeply sinuate, stigmal cross-vein present, petiole of anal cell long.

Examined material. *Syrittosyrphus opacea* Hull: Holotype (Fig. 1), male, "Holo-//type" "Cape Province://Somerset East,//November 1930" "S. Africa.//R.E. Turner.//Brit. Mus.//1930-593." "Holotype//Syrittosyrphus//opacea//Hull" [red label, handwritten] [32.72°S, 25.58°E; coordinates taken from Gazetteer and therefore approximate] [NHMUK].

Other material. South Africa • 1 ♂; Cathedral Peak Area, KwaZulu-Natal; 28°57'S, 29°12'E; 16 Dec 1977; J.G.H. Londt leg.; NMSA-Dip 53518 (NMSA) • 1 ♀; Nkandla Forest Reserve, KwaZulu-Natal; 28°42'36"S, 31°8'29"E; 12 Jun 2003; A.J. Armstrong leg.; NMSA-Dip 65136 (NMSA) • 1 ♀; Royal Natal National Park,

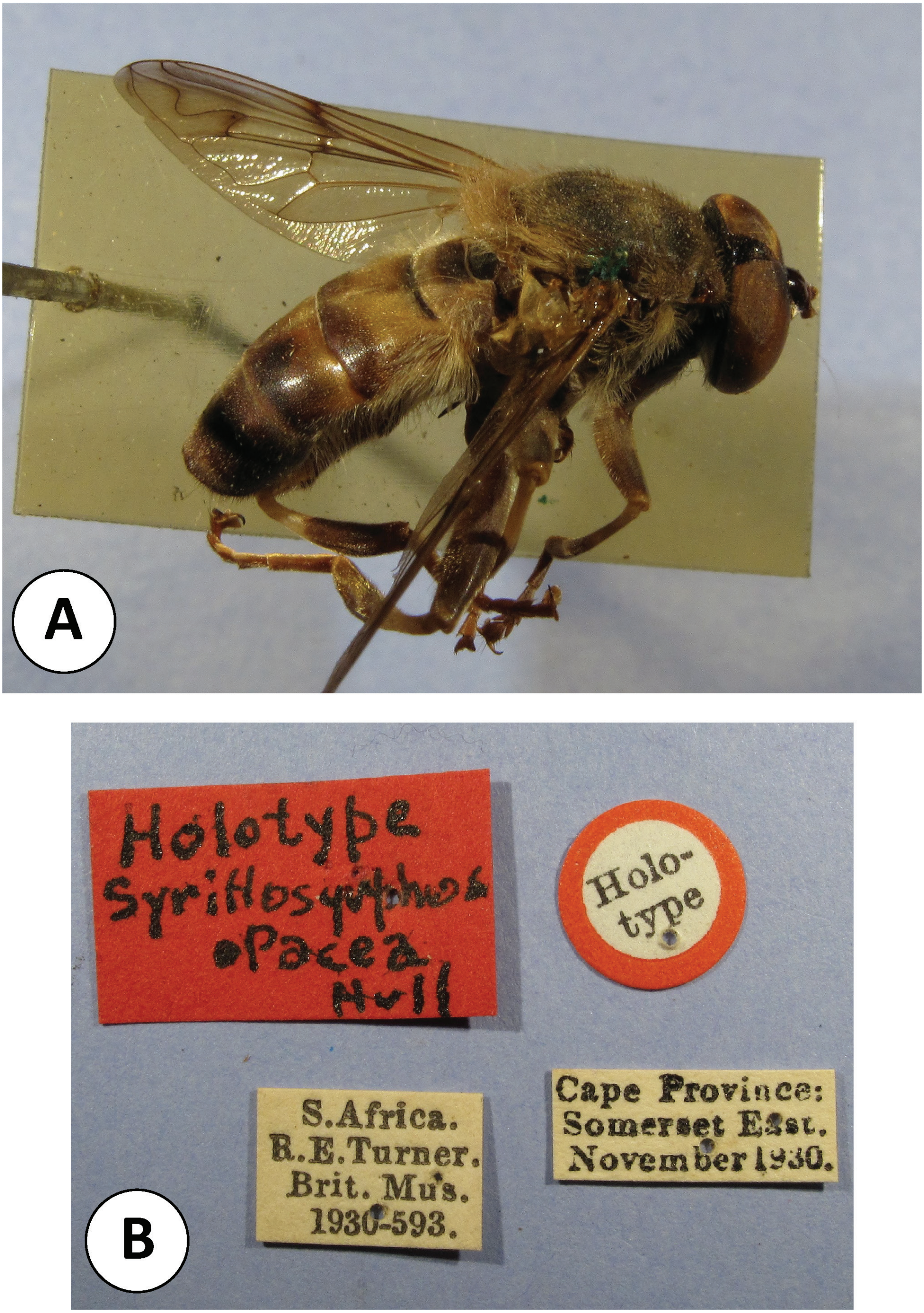

Figure 1. *Syrittosyrphus opacea* Hull, 1944 **A** dorsolateral view of the male holotype **B** labels.

KwaZulu-Natal; 28°41'S, 28°39'E; I.1971; H. Townes leg.; NMSA-Dip 51877 (NMSA) • 1 ♀; Hlatikulu Mountain, Monks Trail Bush edge, KwaZulu-Natal; 28°13'S, 30°01'E; 17 Mar 1997; J.G.H. Londt leg.; NMSA-Dip 015878 (NMSA) • 1 ♀; Forest Glens, N. Drakensberg, Limpopo Province; 23.96951°S, 29.91860°E; Dec 2001; J. Swaye leg.; NMSA-Dip 015879 (NMSA) • 1 ♀; 10 km E of Bedford, on Adelaide-Bedford Road, roadside Karoo bush, Eastern Cape; 32.6667S, 26.2833E (Gazetteer); [date unknown]; D. Barraclough & C. Barraclough leg.; NMSA-Dip 049495 (NMSA) • 1 ♀; Royal Natal National Park, Day Visitor Car Park, KwaZulu-Natal; 28°41'25.4"S, 28°56'53.9"E; 1410 m a.s.l.; 4 Dec 2012; A. Ssymank leg.; (ASPC) • 1 ♂; Karkloof Nature Reserve, KwaZulu-Natal; 29°17'54.53"S, 30°18'21"E; 13 Nov 2018, K. Jordaens; KMMA AB59880784; DNA voucher 1179A01 (KMMA) • not studied, but cited in Horn (2004): 1 ♂ from Forest Glens, northern Drakensberg, Limpopo Province; (WBPC). Zimbabwe • 1 ♀; Vumba; 12 Mar 1964; D. Cookson leg.; NMSA-Dip 32362 (NMSA) • 1 ♂; N Vumba; 6 Feb 1966; D. Cookson leg.; NMSA-Dip 32374 (NMSA).

Re-description male. (Figs 2A, 3A, 4A, C, D: all from NMSA-Dip 53518).

Body length: 15.0 mm (n = 1); wing length: 11.4 mm (n = 1).

Head [Figs 1 and 4A; see also fig. 6G and H, p.15 in Hippa (1990)]: Eyes holoptic; eye contiguity shorter than length of ocellar triangle. Face yellow with median Y-shaped brown non-trichose band, yellow parts densely pale pollinose; pale setose. Gena ochre with brownish-black band from oral margin to eye margin. Clypeus subquadrate, broad, dark brown, greyish microtrichose. Lunule brownish-orange. Frons above antennae dark brown shining, non-pollinose, inflated, with a small central round depression. Frontal triangle brownish to black setose on anterior inferior part, with pale setae dorsally, non-pollinose, except narrowly along eye margin. Ocellar triangle equilateral, ocelli reddish, bare. Occiput pale greyish microtrichose; pale setose. Antennae with scapes and pedicel brownish, non-pollinose; postpedicel twice as long as wide, yellowish, densely greyish pollinose; arista yellow, bare, about 2–2.5 times as long as postpedicel.

Thorax (Figs 1, 2A and 3A): Dark brown to black, scutum yellow pollinose along margins and suture and in anterior part, also along median line, leaving large brownish-black non-pollinose areas with blackish setae. Scutellum yellow, width to length ratio 2.5:1, with premarginal sulcus, long yellow densely setose (setae ca. 1/3–1/2 length of scutellum); subscutellar fringe well developed with dense long yellow setae of ca. 0.45 mm. Pleurae brownish, mostly densely grey pollinose; postpronotum with a small pronounced non-pollinose bulge leading into an elevated rim of the scutum, with yellow and a few black setae intermixed; anterior anepisternum, posterior part of proepimeron and anterior part or posterior anepisternum bare; proepisternum, posterior part of anepisternum and anterior anepimeron with long yellow setae; katepisternum with posteriodorsal tuft of long setae and ventrally setose; meron, metepimeron, katepimeron, katatergite, posterior anepimeron, except for some short microsetae, bare; metasternum densely long yellow setose. Ampulla yellow. Plumula yellowish. Thoracic spiracles with whitish to ochre vestiture.

Figure 2. *Syrittosyrphus opacea* Hull, 1944 **A** dorsal view male **B** dorsal view female.

Figure 3. *Syrittosyrphus opacea* Hull, 1944 **A** lateral view male **B** lateral view female.

Legs [Figs 1, 2A, 3A and 4C: see also fig. 6E and F, p. 16 in Hippa (1990)]: reddish-brown, tibia with basal 1/3 to 1/2 yellow. Mesofemur posteriorly grey pollinose, anteriorly with a broad median pollinose band; short adpressed yellowish setae; tarsae ventrally with short stout black setulae. Mesotibia abruptly broadened in apical 1/4. Mesofemur postero-lateral with a row of longer whitish setae (length ca. 1/2 diameter of mesofemur). Mesotibia slightly dilated apically with apicoventrally a short comb of short black stout setulae and a small pointed tooth on the opposite side. Metacoxa (Fig. 4C) with two black spurs of ca. 1 mm long. Metafemur with posterolateral row of longer whitish setae (length ca. 1/3 of diameter of metafemur); ventrobasally with a low ridge carrying a black comb of short stout black setulae; apicoventrally with a depression that carries a ridge with a row of black stout setae on the anterior side. Metatibia yellow, apical 2/3 brownish; dilated towards apex, apical half carinate posteriorly; anteriorly with an oblique depression at 1/4 from apex.

Wing (Figs 1, 4D): hyaline, along anterior margin yellowish with darkened patches below pterostigma extending to cross-vein *r–m*, wing tip slightly darkened. Anal cell very long. Cell r_1 widely open, in apical half widened and close to wing margin suddenly narrowed, ending at wing margin. Vein R_{4+5} with a deep oblique sinuate loop into cell r_{4+5}. Spurious vein well developed, as thick as other veins, extending into cell r_{4+5}. Anal cell microtrichose with basal area bare. Basal half of wing up to cross-vein *r–m* with sparse microtrichia, with bare areas along veins; apical 1/3 of wing (including entire cell r_{4+5}) densely microtrichose. Calypters white with an orange-brown margin, long yellow-white pilose. Halteres yellow-brown.

Abdomen (Figs 1, 2A, 3A): long and conical; setae from tergites I to IV mostly yellowish short and adpressed, only on lateral margins longer yellow setae. Tergite I yellow to ochre, densely greyish pollinose with the exception of a narrow non-pollinose posterior margin. Tergite II with large orange maculae, with lateral, anterior and posterior margins brownish to black; slightly darkened along median line; mostly non-pollinose. Tergite III narrowly yellow along anterior margin, otherwise dark brown; with sparse, but distinct yellowish to grey pollinosity, pollinosity more dense along median line and towards posterior margin. Tergite IV brownish-black, only anterior part of median line greyish pollinose. On tergites II−IV, the dark coloured parts have short blackish setulae. Hypopygium with brownish-black long setae. Sternite I brownish, densely grey pollinose. Sternite II yellow with black median line; only along anterior margin whitish pollinose. Sternite III anterior and posterior margin yellow, with central broad brownish-black fascia, uniform, but weak pollinose. Sternites I–III with very long dense setae of ca. 2 mm length. Sternite IV brownish-black, distinctly greyish pollinose laterally, with long setae that form a dense comb along lateral margin, leaving a median non-pollinose, almost bare, area of approx. 1/4 to 1/3 of sternal width.

Genitalia [Fig. 5A, B; see also fig. 6A and B, p. 15 in Hippa (1990)]: Epandrium with surstylus dorsally from halfway strongly curved downwards, pointed, ventrally with subtriangular expansion, dorsally and ventrally long yellow-brown pilose. Hypandrium very large and ventrally broadly expanded; aedeagus with a ventral sharp tooth. Cerci broad, club-shaped; on posterior and ventral side long yellow-brown pilose.

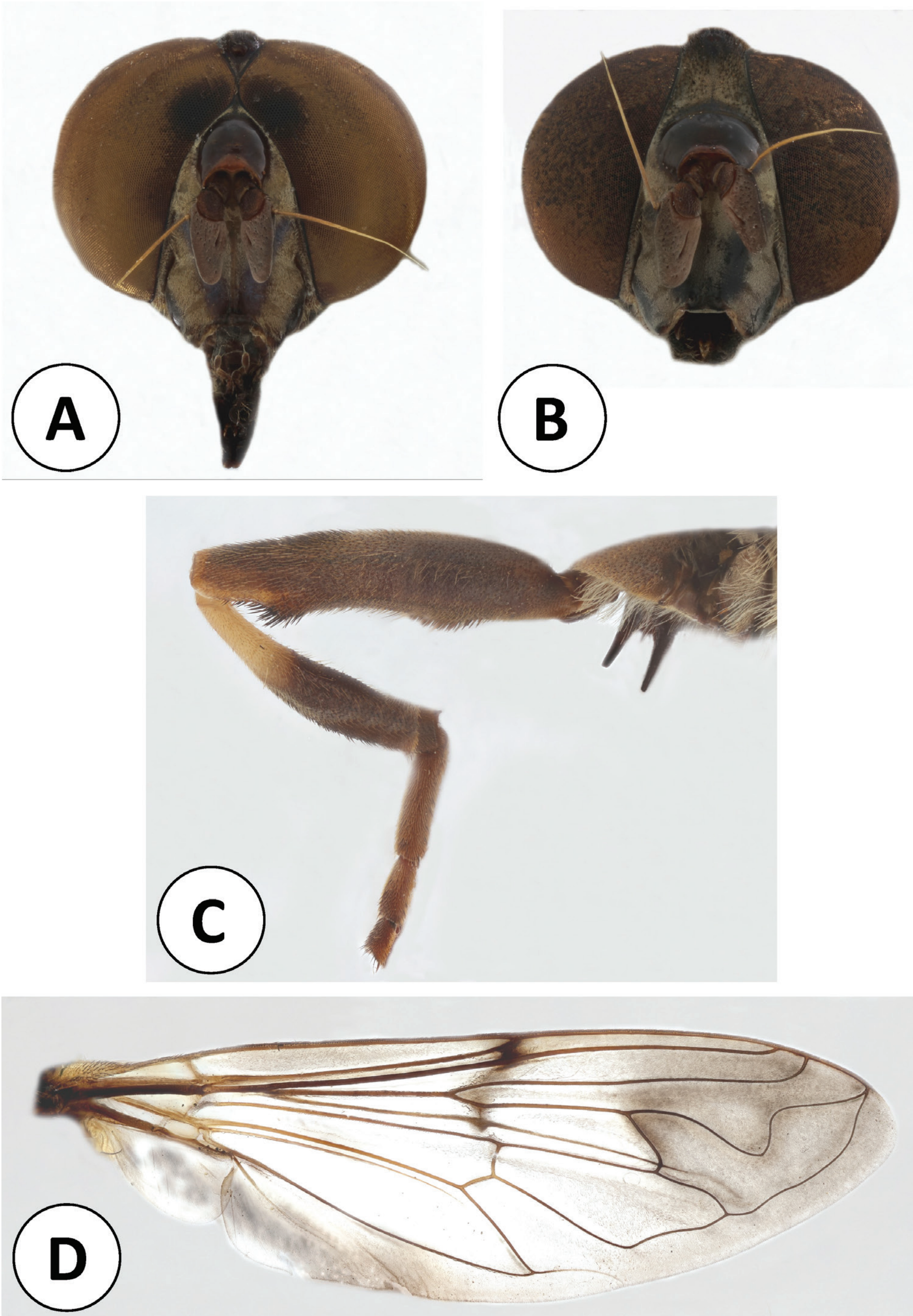

Figure 4. *Syrittosyrphus opacea* Hull, 1944 **A** head male, frontal view **B** head female, frontal view **C** metaleg male, posterior view **D** right wing male.

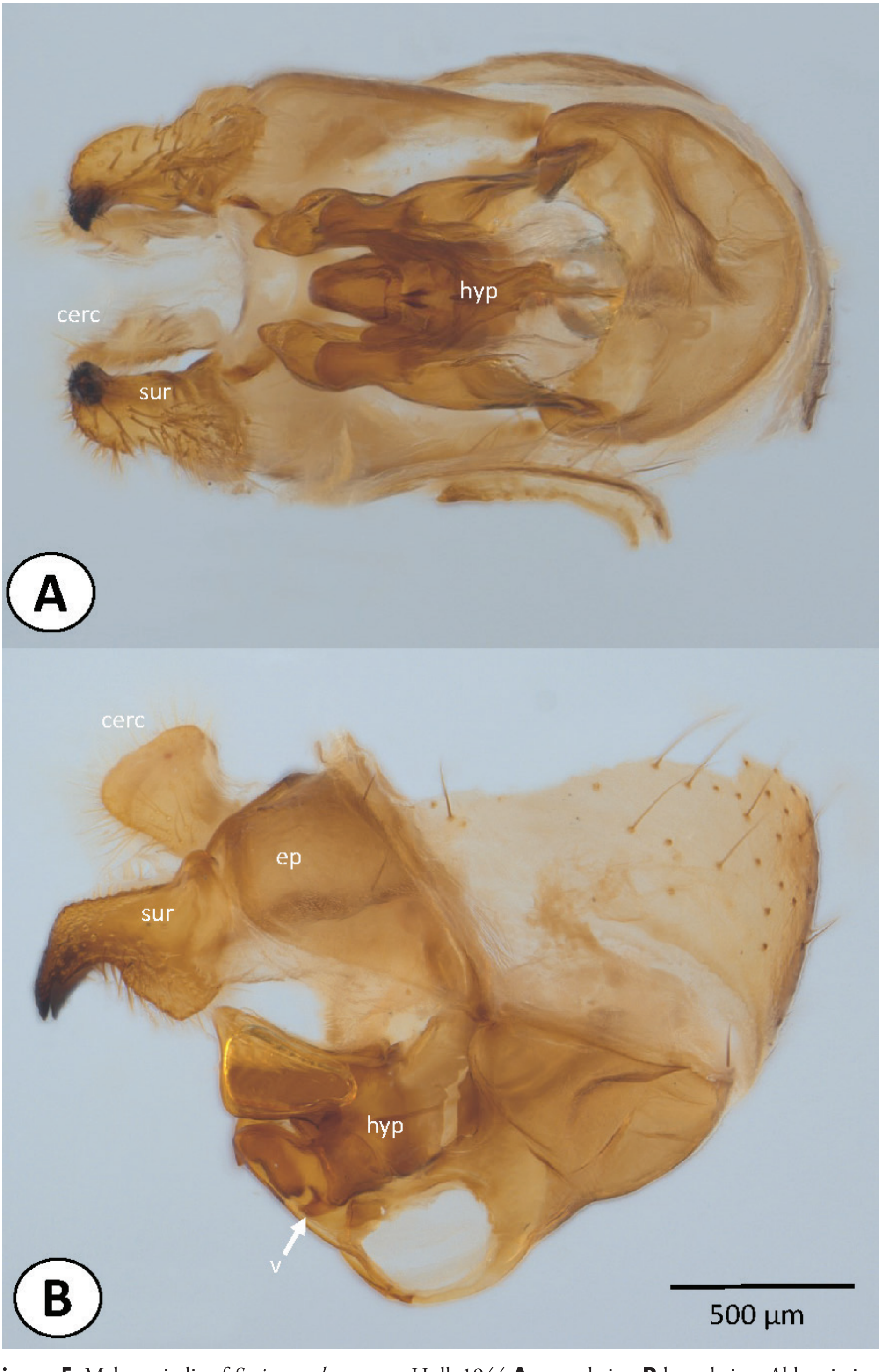

Figure 5. Male genitalia of *Syrittosyrphus opacea* Hull, 1944 **A** ventral view **B** lateral view. Abbreviations: cerc, cercus; ep, epandrium; hyp, hypandrium; v, ventral tooth of the aedeagus.

Description female. Figs 2B, 3B, 4B (specimen NMSA-Dip 65136) and 6 (ASPC).

Body length: 14.0 mm (n = 1); wing length: 11.4 mm (n = 1)

Similar to male, except for distinct sexual dimorphism. Frons with a broad greyish pollinose band with grey setae (Fig. 4B). Ocellar triangle and upper part of frons brownish-black, non-pollinose, brownish to black setose (Fig. 2B). Legs (Figs 2B and 3B): protibia less broadened in apical third. Mesoleg without black setal comb on tip of tibia. Metaleg: coxa without long spur; femur with very low ventral bump, with some stout black setae; basoventral patch of black setae missing; no long pale setae posterolaterally. Abdomen (Figs 2B, 3B): Tergite V black, non-pollinose, black setose, but shorter than in male. Sternites with long pale setae much shorter and less dense than in male (1.5 mm on sternite II, 0.65 mm on sternite V); sternite III + IV with scattered longer setae only; sternite V with only a few longer setae. Genitalia (Fig. 6) compact, tergite 7 approx. 1.5× as broad as long, tergite 8 approx. as long as broad, posteriorly rounded, without lateral apodemes, with very long evenly distributed long yellow-brown pile; epiproct broad, with two rounded anterior areas and with a single basal area with two triangular large apodemes, with a granulated small lateral lobe to the epiproct; sternite 8 large, with an unusual ventral modification, ventrally concave; sternite 9 with conspicuous pigmentation at apical margin; cerci rounded, semi-circular, apical end gently curved inwards, long yellow-brown pilose.

Distribution. South Africa (Hull 1944; this study), Zimbabwe (Whittington 1998) (Fig. 7).

Discussion

We here have described, for the first time, the female of the Afrotropical hoverfly, *Syrittosyrphus opacea*, which allowed us to update the diagnosis of this monotypic genus. As a result, the genus now correctly keys out in a key to the genera of Syrphidae of the Afrotropical Region (Ssymank et al., in press). We obtained a single DNA barcode and the uncorrected p-distance with any other Afrotropical hoverfly species is ≥ 10%. Its closest relative in the Afrotropical Region seems to be an undescribed species from the Ruwenzori Mountains in Uganda which we currently cannot attribute to any known genus (Jordaens et al., unpublished data).

Syrittosyrphus opacea seems to be a SE African endemic and, so far, has only been recorded from South Africa (nine localities) and Zimbabwe (one locality) (Fig. 7). The species is very rare with, up to now, five males and seven females known (see list of Material Studied). Very little is known of its ecology, but all specimens were collected from November to mid-March, except for one which was collected in June. Judging from the indigenous forest map of South-Africa (fig. 12.2, p. 586 or fig. 12.3, p. 588 in Mucina and Geldenhuys 2006), the species seems to occur in Southern Mistbelt Forests (Somerset East (type locality), Bedford, Karkloof Nature Reserve, Nkandla Forest Reserve), Northern Mistbelt Forests (Forest Glens) or Northern Afrotemperate Forests (Cathedral Peak Area, Royal Natal National Park, Hlatikulu Mountain). The localities

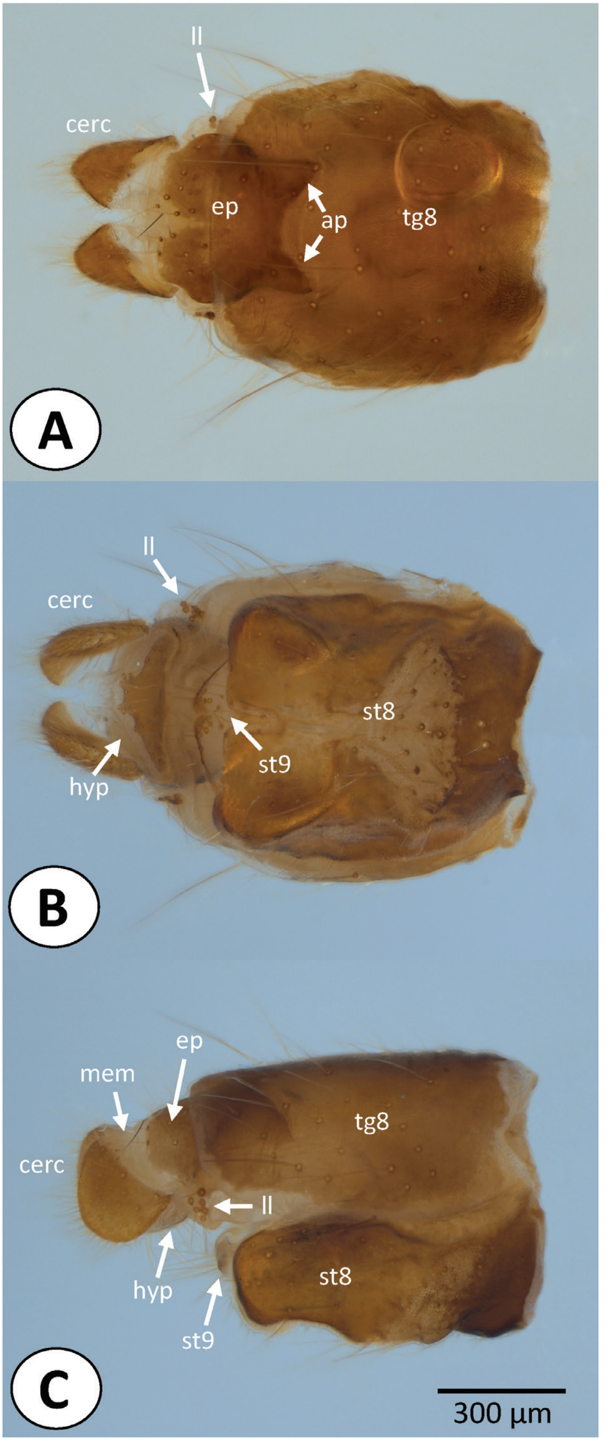

Figure 6. Female genitalia of *Syrittosyrphus opacea* Hull, 1944 **A** dorsal view **B** ventral view **C** lateral view. Abbreviations: ap, apodeme of epiproct; cerc, cercus; ep, epiproct; hyp, hypoproct; ll, lateral lobe to the epiproct; mem, membranous area between epiproct and cerci; st8, sternite 8; st9, sternite 9; tg8, tergite 8.

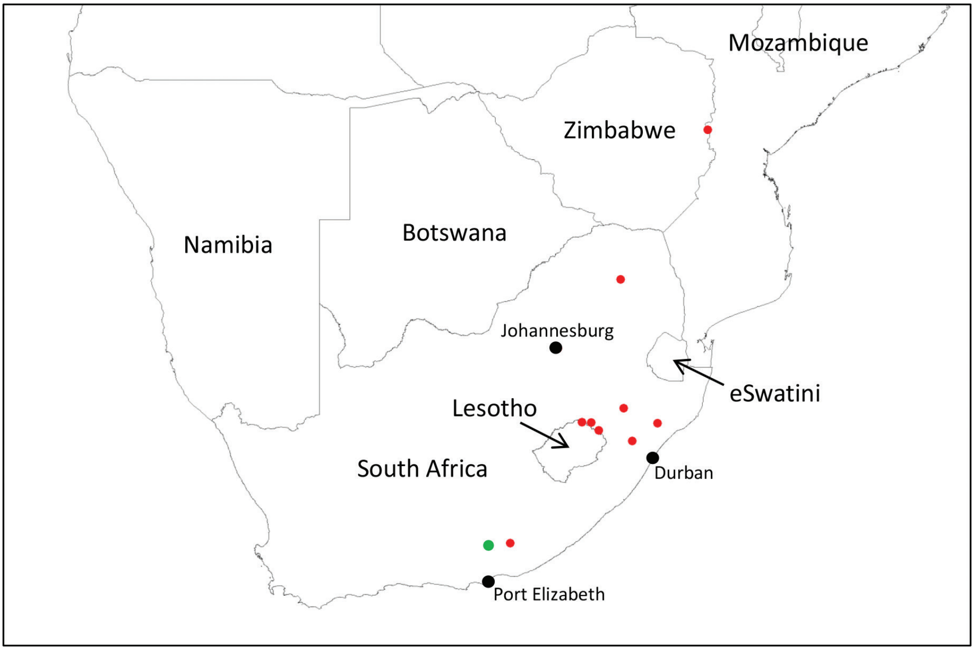

Figure 7. Distribution of *Syrittosyrphus opacea* Hull, 1944 in South Africa and Zimbabwe. Red dots: distribution records; green dot: type locality.

at Cathedral Peak Area and Royal Natal National Park are not indicated on the map in Mucina and Geldenhuys (2006), but these areas still have small forest patches (J. Midgley, pers. comm.; as in fig. 12.5, p. 590 in Mucina and Geldenhuys 2006). Additionally, the Vumba mountains (Zimbabwe) would classify as Northern Afrotemperate Forest. Flower visits have not been observed, but the short stout proboscis (2.6–3.1 mm) with broad labellum suggests that the species is visiting open flowers. Adults have been observed sitting on the ground at forest margins or in sun-lit patches on the forest floor. Some have been collected from Malaise traps. Immature stages are unknown.

With the detailed re-description of the male and the description of the female provided here, both sexes of *Syrittosyrphus opacea* can now be unambiguously identified. The available records of this rare SE African endemic species suggest a distribution linked to three forest types along the Eastern Escarpment (Northern Afrotemperate Forest and Northern and Southern Mistbelt Forests). Based on these habitats, together with vegetation maps, future research may close distribution gaps and clarify the biology.

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Gonçalves Miranda and an anonymous referee for their valuable comments which have improved the manuscript considerably. We also thank Gil Felipe Gonçalves Miranda for a fruitful discussion on the female genital morphology. Financial support was received through the Directorate-general Development Cooperation and Humanitarian Aid (DGD) to the RMCA (project DIPoDIP: Diversity of Pollinating Diptera in South African Biodiversity Hotspots) and the joint Belspo-NRF South Africa project DIPTATEACH (Diptera Museum Collections as a Source for Taxonomic Research and Teaching Activities).

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RESEARCH ARTICLE

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Labiobaetis Novikova & Kluge in West Africa (Ephemeroptera, Baetidae), with description of a new species

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Abstract

Material collected between 1984 and 1988 in Guinea and Mali and between 2003 and 2008 in the Ivory Coast substantially increased our knowledge of *Labiobaetis* Novikova & Kluge in West Africa. We identified eight different species using morphological characters. One species, *L. ediai* **sp. nov.**, is new to science; it is described and illustrated, based on its nymphs. The status of *L. boussoulius* (Gillies, 1993) is discussed and the divergent morphology of *L. elouardi* (Gillies, 1993) is compared to other species of *Labiobaetis*. A key to the nymphs of all West African species is provided and the distribution of *Labiobaetis* species in the Afrotropical realm is discussed.

Keywords

Afrotropical, COI, Gambia, Guinea, Ivory Coast, Mali, morphology

Introduction

The family Baetidae has the highest species diversity amongst mayflies, comprising ca. 1,100 species in 114 genera (updated from Sartori and Brittain 2015, Jacobus et al. 2019, Cruz et al. 2020), which is approximately one third of all mayfly species worldwide. They have a cosmopolitan distribution, except for New Zealand (Gattolliat and

Nieto 2009). Investigations of the molecular phylogeny of the Order Ephemeroptera revealed the relatively primitive status of the family (Ogden and Whiting 2005; Ogden et al. 2009; Ogden et al. 2019).

The genus *Labiobaetis* Novikova & Kluge, 1987, is one of the richest genera of mayflies with 145 previously described species (Barber-James et al. 2013; Kaltenbach et al. 2020 and citations therein; Kaltenbach and Gattolliat 2021). The distribution of *Labiobaetis* is nearly worldwide, except for the Neotropical realm, New Zealand, New Caledonia and some remote islands. The history and concept of the genus *Labiobaetis* were recently summarised in detail (Shi and Tong 2014; Kaltenbach and Gattolliat 2018).

Recently, integrative taxonomy was applied on collections from the highly diverse regions of Southeast Asia and New Guinea, but also from Africa and many species were described and named (Kaltenbach and Gattolliat 2018, 2019, 2020a, 2021; Kaltenbach et al. 2020). The present contribution will focus on West Africa, which forms its own freshwater ecoregion as one of the five sub-regions of the Afrotropical realm (Barber-James and Gattolliat 2012: fig. 1).

The status of Afrotropical mayfly research was depicted by Barber-James and Gattolliat (2012). The history of taxonomic studies of *Labiobaetis* in the Afrotropical realm was briefly summarised in Kaltenbach and Gattolliat (2021). West Africa has a long history of mayfly research in general and many collections and studies were undertaken in that region. Between 1974 and 1989, the French ORSTOM (Office de la recherche scientifique et technique outre-mer), presently the IRD (Institut de Recherche pour le Développement), conducted field research in West Africa as part of an important onchocerciasis control programme (Lévêque et al. 2003). Aquatic macroinvertebrates were collected in about 100 localities, mainly in Guinea, Ivory Coast and Mali. Most localities were sampled regularly over a period of several years. As the systematics of aquatic insects was still poorly-known at the time, important alpha taxonomic research was conducted and several articles were published, including descriptions of new species and genera. The majority of mayflies known from West Africa were described, based on material collected during this programme (e.g. Elouard and Forge 1978; Gillies 1980, 1989, 1993, 1997; Elouard 1986a, b; Elouard and Gillies 1989; Elouard et al. 1990; Gillies and Elouard 1990; Elouard and Hideux 1991; Wuillot and Gillies 1993a, b, 1994; Gattolliat 2006; Gattolliat and Sartori 2006; Kaltenbach and Gattolliat 2020b), including three species of *Labiobaetis* (Gillies 1993). The present study is partly based on nymphs collected during the ORSTOM programme between 1984 and 1988 in Guinea, Ivory Coast and Mali. Another part of the material came from ecological studies done in the Ivory Coast 2003–2008 (Edia et al. 2015) (Fig. 1). Edia et al. (2015: tables 1, 2, fig. 1) also described the environmental characteristics and physical conditions of some of the river systems and a part of the sampling sites in the Ivory Coast (Rivers Ehania, Soumié, Eholié and Noé).

So far, only four species of *Labiobaetis* are known from West Africa: *L. boussoulius* (Gillies, 1993), *L. elouardi* (Gillies, 1993), *L. gambiae* (Gillies, 1993) and *L. piscis* Lugo-Ortiz and McCafferty, 1997 (Gillies 1993; Arimoro and Muller 2010). Here, we report four additional species from different West African countries, one of which is

Figure 1. Map of Africa with studied countries in red: Gambia, Guinea, Mali, Ivory Coast.

described and illustrated as a new species, based on nymphs (*L. glaucus* (Agnew, 1961), *L. latus* (Agnew, 1961), *L. vinosus* (Barnard, 1932) and *L. ediai* sp. nov.).The status of *L. boussoulius* is discussed below; the morphological particularities of *L. elouardi* are depicted and compared to other species in other realms. The total number of *Labiobaetis* species worldwide has now been increased to 146.

Materials and methods

The specimens were collected between 1984 and 1988 in Guinea and Mali by Jean-Marc Elouard (France) during the French ORSTOM programme for the control of onchocerciasis and between 2003 and 2008 in the Ivory Coast by Edia Oi Edia (Université Nangui Abrogoua, Abidjan, Ivory Coast), partly together with one of the authors (JLG). The nymphs were preserved in 70%–96% ethanol.

Table 1. Coordinates of locations of examined specimens (*L. gambiae*: localities Ivory Coast Eh1, Eh2, S1, E2, N2 from Edia et al. 2015, material not examined).

Species	Locality	GPS coordinates
L. boussoulius	Guinea: Boussoulé	10°38'39"N, 09°11'25"W
L. ediai sp. nov.	Ivory Coast: Affiénou	05°24'39"N, 02°55'43"W
	Ivory Coast: Anoblékro	05°29'44"N, 03°22'15"W
	Ivory Coast: Banco	05°23'17"N, 04°03'13"W
	Ivory Coast: Goré	06°22'28"N, 06°34'27"W
	Ivory Coast: Grobiakoko	05°51'18"N, 05°31'00"W
	Ivory Coast: Pont Ehania	05°16'42"N, 02°50'01"W
	Ivory Coast: Pont Soumié	05°24'53"N, 03°16'56"W
L. elouardi	Guinea: Mt. Nimba	07°46'N, 08°15'W
	Ivory Coast: Banco	05°23'17"N, 04°03'13"W
L. gambiae	Gambia: Wali Kunda	13°42'N, 15°07'W
	Ivory Coast: Akakro	05°28'36"N, 03°08'25"W
	Ivory Coast: Boubo	05°18'08"N, 04°22'37"W
	Ivory Coast: Goré	06°22'28"N, 06°34'27"W
	Ivory Coast: Grobiakoko	05°51'18"N, 05°31'00"W
	Ivory Coast: M'possa	05°28'37"N, 02°51'30"W
	Ivory Coast: Niambré	05°52'46"N, 05°36'55"W
	Ivory Coast: Pont Soumié	05°24'53"N, 03°16'56"W
	Ivory Coast: Riv. Ehania Eh1	05°24'N, 02°55'W
	Ivory Coast: Riv. Ehania Eh2	05°17'N, 02°50'W
	Ivory Coast: Riv. Eholié E2	05°23'N, 03°08'W
	Ivory Coast: Riv. Noé N2	05°18'N, 02°46'W
	Ivory Coast: Riv. Soumié S1	05°29'N, 03°22'W
	Mali: Tienfala	12°43'N, 07°44'W
L. glaucus	Ivory Coast: Loc. Aboisso	05°28'04"N, 03°12'26"W
	Ivory Coast: Pont Soumié	05°24'53"N, 03°16'56"W
	Mali: Kati-Kita	12°44'N, 08°03'W
	Mali: Missira	13°48'N, 08°38'W
	Mali: Sotuba	12°39'N, 07°54'W
	Mali: Tienfala	12°43'N, 07°44'W
L. latus	Guinea: Diani	08°55'00"N, 08°08'00"W
	Guinea: Férédougouba	08°26'N, 07°10'W
	Guinea: Kissidougou-Kankan	09°19'N, 09°52'W
	Guinea: Loffa	08°27'N, 09°18'W
	Guinea: N'Zébéla	08°04'N, 09°05'W
	Guinea: Sassambaya	10°07'24"N, 09°44'06"W
	Ivory Coast: Anoblékro	05°29'44"N, 03°22'15"W
	Ivory Coast: Grobiakoko	05°51'18"N, 05°31'00"W
	Ivory Coast: Pont Ehania	05°16'42"N, 02°50'01"W
	Mali: Loc. Kati-Kita	12°44'N, 08°03'W
L. piscis	Guinea: Mt. Nimba	07°46'N, 08°15'W
	Ivory Coast: Anoblékro	05°29'44"N, 03°22'15"W
	Ivory Coast: Banco	05°23'17"N, 04°03'13"W
	Ivory Coast: Biaka	05°28'N, 03°11'W
	Mali: Tienfala	12°43'N, 07°44'W
L. vinosus	Ivory Coast: Akakro	05°28'36"N, 03°08'25"W
	Ivory Coast: Anoblékro	05°29'44"N, 03°22'15"W
	Ivory Coast: Banco	05°23'17"N, 04°03'13"W
	Ivory Coast: Pont Soumié	05°24'53"N, 03°16'56"W

The dissection of nymphs was done in Cellosolve (2-Ethoxyethanol) with subsequent mounting on slides with Euparal liquid, using an Olympus SZX7 stereomicroscope.

The DNA of some specimens was extracted using non-destructive methods allowing subsequent morphological analysis (see Vuataz et al. 2011 for details). We amplified a 658 bp fragment of the mitochondrial gene cytochrome oxidase subunit 1 (COI) using the primers LCO 1490 and HCO 2198 (Folmer et al. 1994, see Kaltenbach and Gattolliat 2020a for details). Sequencing was done with Sanger's method (Sanger et al. 1977).

Drawings were made using an Olympus BX43 microscope. To facilitate the determination of the new species and the comparison of important structures with other species, we partly used a combination of dorsal and ventral aspects in one drawing (see Kaltenbach et al. 2020: fig. 1).

Photographs of nymphs were taken using a Canon EOS 6D camera and the Visionary Digital Passport imaging system (http://www.duninc.com) and processed with Adobe Photoshop Lightroom (http://www.adobe.com) and Helicon Focus version 5.3 (http://www.heliconsoft.com). Photographs were subsequently enhanced with Adobe Photoshop Elements 13.

Approximate GPS coordinates to the older sample locations (1984–1988) were attributed using Google Earth (https://www.google.com/earth/download/ge/) and Elouard et al. 1990: fig. 2. Distribution maps were generated with SimpleMappr (https://simplemappr.net, Shorthouse 2010). The coordinates of the sample locations are given in Table 1. The dichotomous key was elaborated with the support of DKey version 1.3.0 (http://drawwing.org/dkey, Tofilski 2018).

The terminology follows Hubbard (1995) and Kluge (2004). The form of the description follows the one used for other recent descriptions of *Labiobaetis*, as in Kaltenbach et al. 2020.

Abbreviations:

NHM The Natural History Museum (London, Great Britain);
MZL Musée de Zoologie Lausanne (Switzerland).

Results

List of *Labiobaetis* species from West Africa

1. *L. boussoulius* (Gillies, 1993)
2. *L. ediai* sp. nov.
3. *L. elouardi* (Gillies, 1993)
4. *L. gambiae* (Gillies, 1993)
5. *L. glaucus* (Agnew, 1961), new for West Africa
6. *L. latus* (Agnew, 1961), new for West Africa
7. *L. piscis* Lugo-Ortiz & McCafferty, 1997
8. *L. vinosus* (Barnard, 1932), new for West Africa

1. *Labiobaetis boussoulius* (Gillies, 1993)

Labiobaetis boussoulius: Gillies 1993: figs 4–12 (*Baetis boussoulius*)

Differential diagnoses. Nymph. Following combination of characters: A) scape without distolateral process; B) labial palp segment II with broad, thumb-like distomedial protuberance; C) maxillary palp segment II with strongly developed excavation at inner distolateral margin, segment II 1.8–1.9× length of segment I (Fig. 2a); D) fore femur mostly rather slender, length 3.1–4.1× maximum width; dorsal margin with 9–12 spine-like setae; femoral patch well developed (Fig. 3a); E) hind protoptera well developed; F) seven pairs of gills.

Material examined. *Holotype*. Guinea • Exuviae and male imago; Milo River, Boussoulé; 13.02.1986; leg. M.T. Gillies and J.-M. Elouard; on slides; NHM10017042, NHM10017043; NHM. **Other material.** Guinea • 4 nymphs; same data as holotype; on slides; NHM10017044, NHM10017045, NHM10017046, NHM10017047; NHM • 7 nymphs, 3 imagos; Milo River, Boussoulé; 22.12.1984; 2 nymphs on slides; GBIFCH00592438, GBIFCH00592763; 5 nymphs, 3 imagos in alcohol; GBIFCH00515625; MZL.

Distribution. Guinea (Fig. 4a).

2. *Labiobaetis ediai* sp. nov.

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Figures 4b, 5–7

Differential diagnosis. Nymph. Following combination of characters: A) scape without distolateral process; B) labial palp segment II with rather narrow, thumb-like distomedial protuberance; segment III slightly pentagonal; C) maxillary palp segment II with slight excavation at inner distolateral margin; D) fore femur rather broad, length ca. 3× maximum width; dorsal margin with 7–9 curved, spine-like setae; femoral patch absent; E) hind protoptera absent; F) six pairs of gills; G) paraproct slightly expanded, with 35–44 marginal spines.

Description. Nymph (Figs 5–7). Body length 3.3–4.0 mm. Cerci: slightly shorter than body length. Paracercus: ca. ½ of cerci length. Antenna: approx. 3× as long as head length.

Colouration (Fig. 5). Head, thorax and abdomen dorsally and ventrally brown. Legs light brown, caudalii light brown.

Antenna (Fig. 6f) with scape and pedicel subcylindrical, without distolateral process at scape.

Labrum (Fig. 7a). Subrectangular, length 0.6× maximum width. Distal margin with medial emargination and small process. Dorsally with long, fine, simple setae scattered over surface; submarginal arc of setae composed of ca. 13 long, feathered

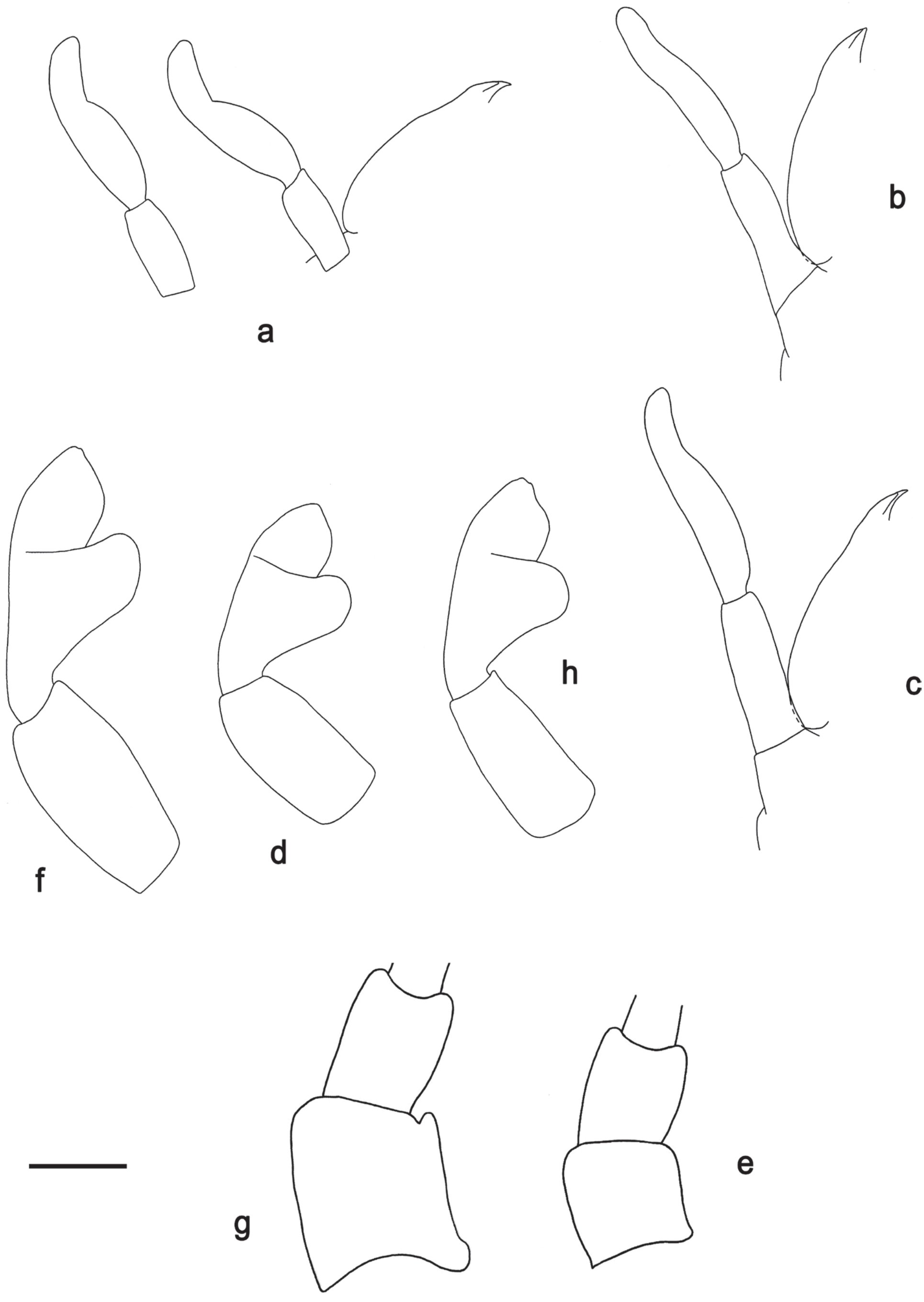

Figure 2. Nymph morphology **a** *Labiobaetis boussoulius*, maxillary palps **b–e** *Labiobaetis glaucus* **b, c** maxillary palps **d** labial palp **e** base of antenna **f, g** *Labiobaetis latus* **f** labial palp **g** base of antenna **h** *Labiobaetis vinosus*, labial palp. Scale bar: 0.1 mm.

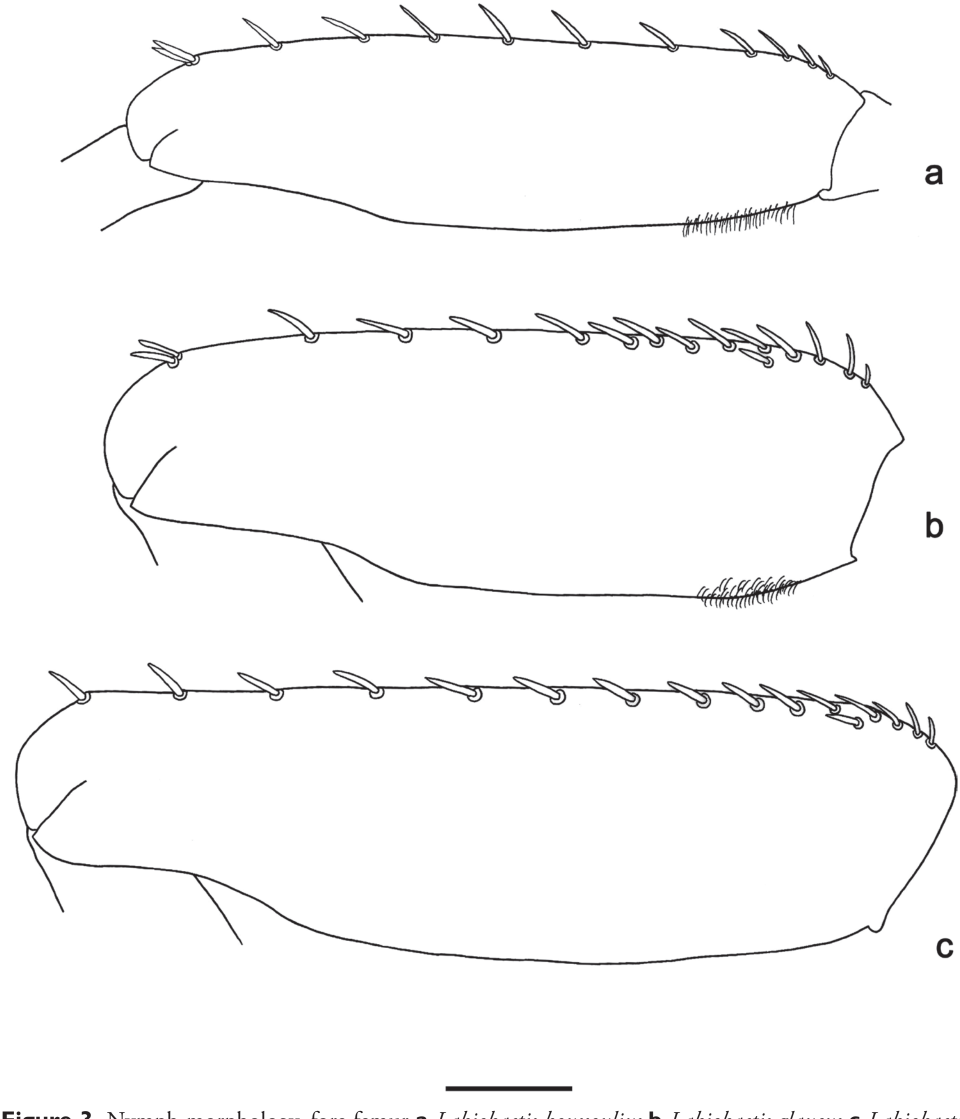

Figure 3. Nymph morphology, fore femur **a** *Labiobaetis boussoulius* **b** *Labiobaetis glaucus* **c** *Labiobaetis latus*. Scale bar: 0.1 mm.

setae. Ventrally with marginal row of setae composed of lateral and anterolateral long, feathered setae and medial long, bifid, pectinate setae; ventral surface with ca. four short, spine-like setae near lateral and anterolateral margin.

Right mandible (Fig. 7b, c). Incisor and kinetodontium fused. Incisor with five denticles; kinetodontium with three denticles, inner margin of innermost denticle with row of thin setae. Prostheca robust, apically denticulate. Margin between prostheca and mola slightly convex, with minute denticles. Tuft of setae at apex of mola present.

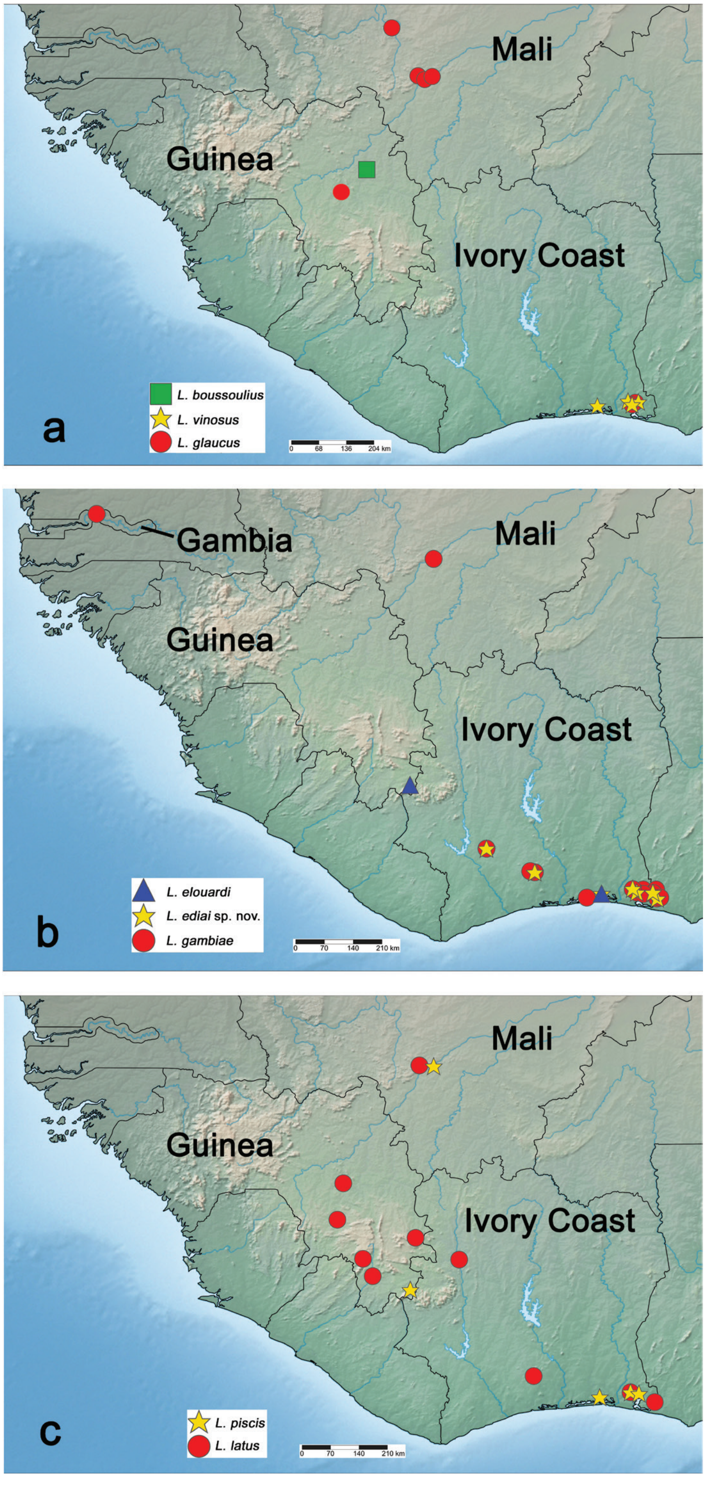

Figure 4. Distribution of *Labiobaetis* in West Africa.

Figure 5. *Labiobaetis ediai* sp. nov., nymph, habitus. Scale bar: 1 mm.

Left mandible (Fig. 7d, e). Incisor and kinetodontium fused. Incisor with four denticles; kinetodontium with three denticles. Prostheca robust, apically with small denticles and comb-shaped structure. Margin between prostheca and mola almost straight, with minute denticles towards subtriangular process. Subtriangular process long and slender, above level of area between prostheca and mola. Denticles of mola apically constricted. Tuft of setae at apex of mola absent.

Both mandibles with lateral margins almost straight. Basal half with fine, simple setae scattered over dorsal surface.

Hypopharynx and superlinguae (Fig. 7f). Lingua slightly longer than superlinguae. Lingua longer than broad; medial tuft of stout setae well developed; distal half laterally slightly expanded. Superlinguae distally straight; lateral margins rounded; fine, long, simple setae along distal margin.

Maxilla (Fig. 7g). Galea-lacinia ventrally with two simple, apical setae under canines. Inner dorsal row of setae with three denti-setae, distal denti-seta tooth-like, middle and proximal denti-setae slender, bifid and pectinate. Medially with one pectinate, spine-like seta and three or four simple setae. Maxillary palp longer than length of galea-lacinia; 2-segmented; palp segment II 1.5× length of segment I; setae on maxillary palp fine, simple, scattered over surface of segments I and II; apex of last segment rounded, with slight excavation at inner distolateral margin.

Labium (Fig. 7h). Glossa basally broad, narrowing towards apex; shorter than paraglossa; inner margin with four or five spine-like setae, distalmost seta much longer than other setae; apex with two long and one medium, robust, pectinate setae; outer margin with four or five spine-like setae increasing in length distally; ventral surface with fine, simple, scattered setae. Paraglossa sub-rectangular, curved inwards; apex rounded; with three rows of long, robust, distally pectinate setae in apical area and one or two short, simple setae in anteromedial area; dorsally with row of three long, spine-like, simple setae near inner margin. Labial palp with segment I 0.7× length of segments II and III combined. Segment I ventrally with short, fine, simple setae. Segment II with rather narrow,

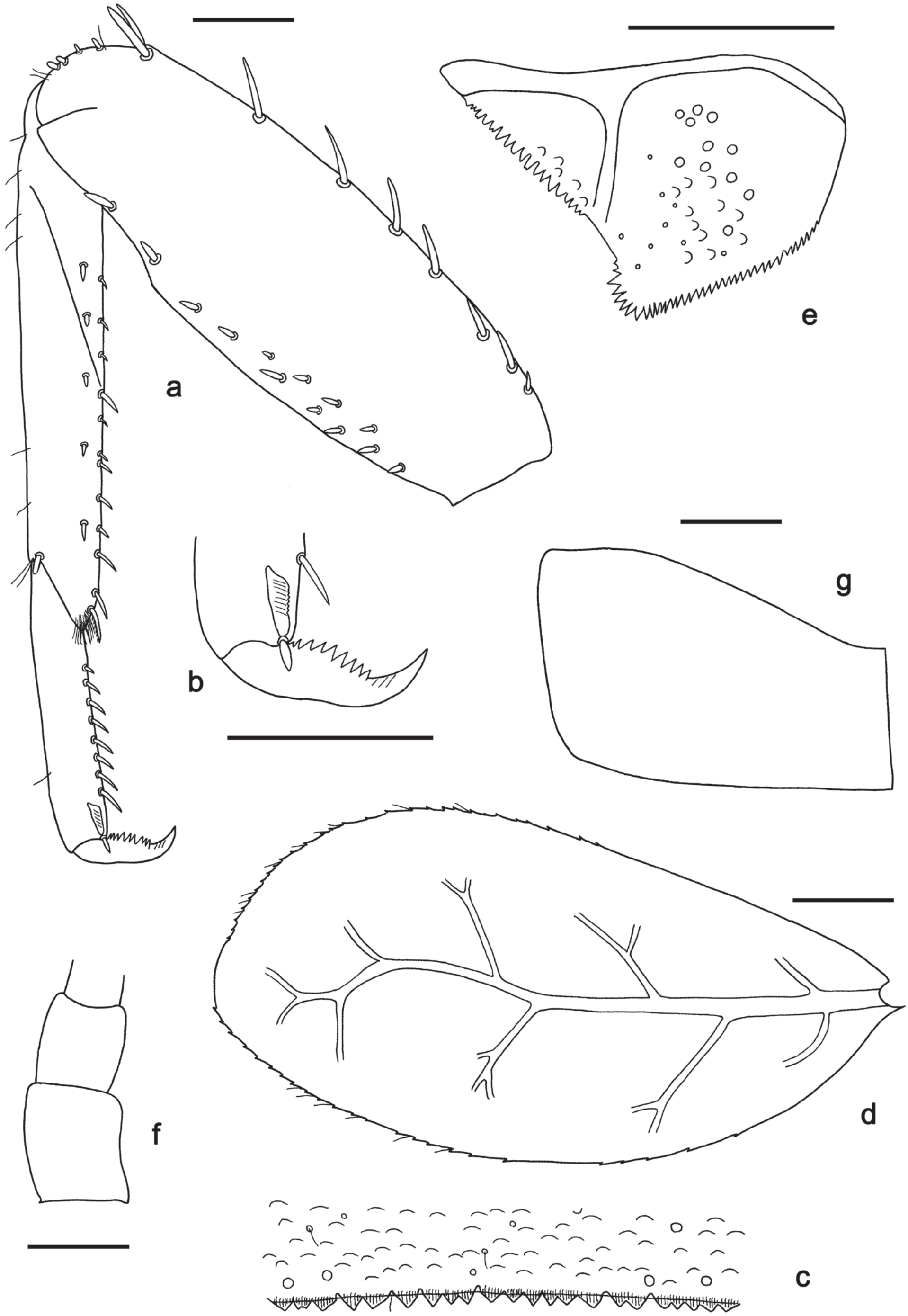

Figure 6. *Labiobaetis ediai* sp. nov., nymph morphology **a** foreleg **b** fore claw **c** tergum IV **d** gill IV **e** paraproct **f** base of antenna **g** metanotum (left side), without hind protopteron (mature nymph). Scale bars: 0.1 mm.

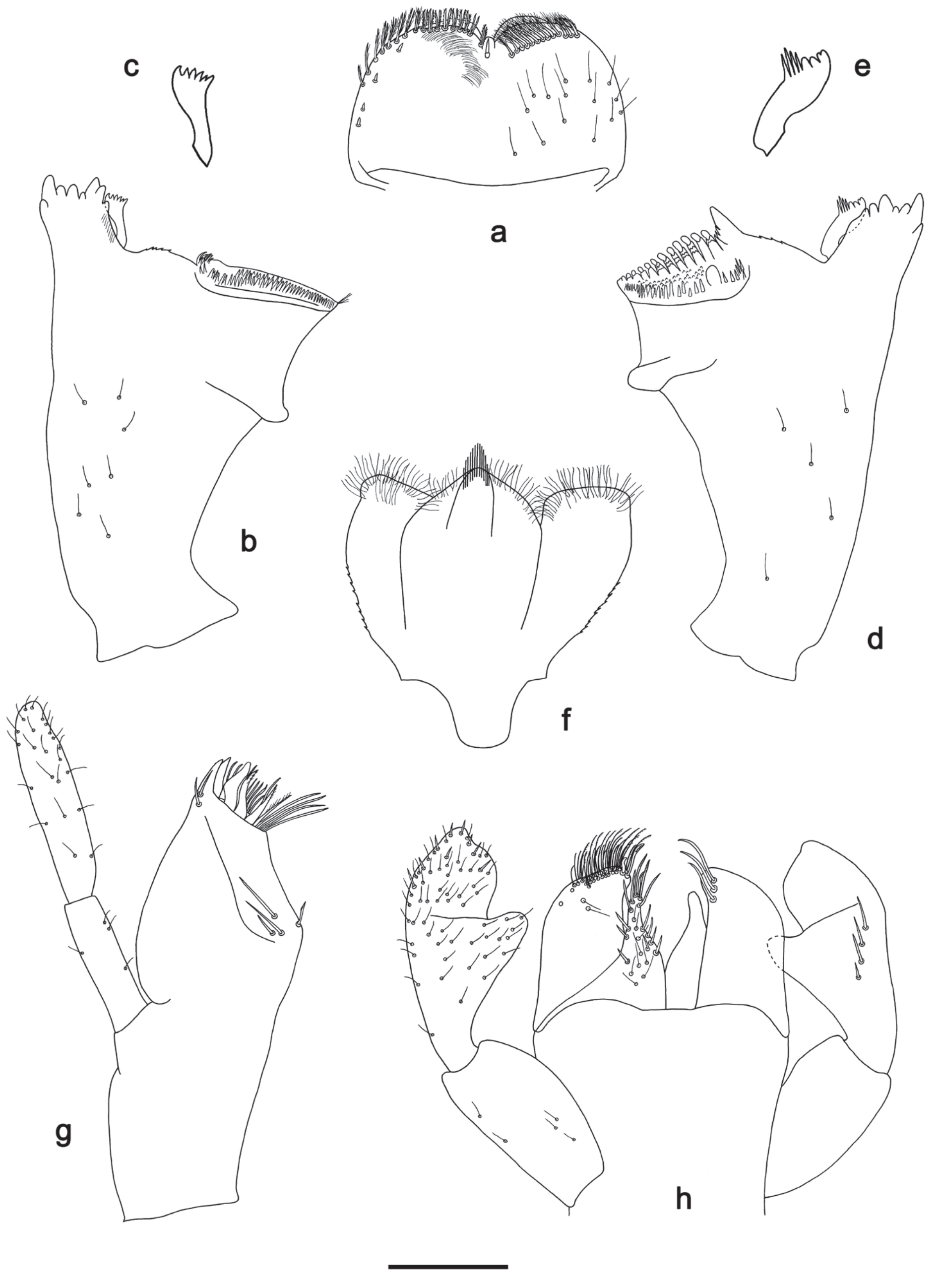

Figure 7. *Labiobaetis ediai* sp. nov., nymph morphology **a** labrum **b** right mandible **c** right prostheca **d** left mandible **e** left prostheca **f** hypopharynx and superlinguae **g** maxilla **h** labium. Scale bar: 0.1 mm.

thumb-like distomedial protuberance; distomedial protuberance 0.5× width of base of segment III; ventral surface with short, fine, simple setae; dorsally with four spine-like setae near outer margin. Segment III slightly pentagonal; apex slightly pointed; length 1.1× width; ventrally covered with short, spine-like, simple setae and short, fine, simple setae.

Hind protoptera (Fig. 6g) absent.

Foreleg (Fig. 6a, b). Ratio of foreleg segments 1.2:1.0:0.6:0.2. ***Femur.*** Length ca. 3× maximum width. Dorsal margin with 7–9 curved, spine-like setae; length of setae 0.29× maximum width of femur. Apex rounded, with pair of spine-like setae and some short, stout setae. Stout, lanceolate setae scattered along ventral margin; femoral patch absent. ***Tibia.*** Dorsal margin with row of scarce, fine simple setae. Ventral margin with row of short to medium, curved, spine-like setae, distad of patellotibial suture one longer, curved, spine-like seta, on apex, some longer setae and tuft of fine, simple setae. Anterior surface scattered with short, stout, lanceolate setae. Patellotibial suture present on basal half area. ***Tarsus.*** Dorsal margin almost bare. Ventral margin with row of curved, spine-like setae. ***Claw*** with one row of nine or ten denticles; distally pointed; with ca. three stripes; subapical setae absent.

Terga (Fig. 6c). Surface with irregular rows of U-shaped scale bases and scattered fine, simple setae and micropores. Posterior margin of tergum IV with triangular spines, wider than long.

Gills (Fig. 6d). Present on segments II–VII. Margin with small denticles intercalating fine simple setae. Tracheae extending from main trunk to inner and outer margins. Gill IV as long as length of segments V, VI and half VII combined; gill VII as long as length of segments VIII, IX and half X combined.

Paraproct (Fig. 6e). Distally slightly expanded, with 35–44 marginal spines. Surface scattered with U-shaped scale bases and micropores. Cercotractor with small, marginal spines.

Etymology. Dedicated to the collector of the specimens, Dr. Edia Oi Edia (Université Nangui Abrogoua, Abidjan, Ivory Coast), in recognition of his contribution to the knowledge of aquatic insects from the Ivory Coast.

Biological aspects. The specimens were collected at altitudes between sea level and 200 m, mostly together with one or several other West African species (*L. elouardi*, *L. gambiae*, *L. glaucus*, *L. latus*, *L. piscis* and *L. vinosus*). The characteristics and environmental conditions of some of the sampling sites are described in Edia et al. 2015: table 2 (Anoblékro = S1, Pont Ehania = Eh2, Pont Soumié = S2): water temperature ca. 25 °C, pH 6.8–7.1 and bottom substrata consisting of 0–25% rocks, 10–35% gravel, 40–45% sand and 20–35% clay/mud.

Distribution. Ivory Coast (Fig. 4b).

Type-material. *Holotype.* Ivory Coast • nymph; Loc. Pont Ehania, Riv. Ehania; 05°16'42"N, 02°50'01"W;14.06.2008; leg. J.-L. Gattolliat and E.O. Edia; on slide; GenBank MH070294; GBIFCH00465136; MZL. ***Paratypes.*** Ivory Coast • 21 nymphs; same data as holotype; 18 in alcohol; GBIFCH00515550, GBIFCH00515551, GBIFCH00515623; 3 on slides; GenBank MH070295; GBIFCH00465137, GBIFCH00592376, GBIFCH00592408; MZL • 1 nymph; Riv. Soumié, Loc. Anoblékro; 05°29'44"N, 03°22'15"W; 01.09.2003; leg. E.O. Edia; on slide; GBIFCH00592379; MZL • 9 nymphs; Grobiakoko; 05°51'18"N, 05°31'00"W; 29.10.2006; leg. E.O. Edia; 7 in alcohol; GBIFCH00515541, GBIFCH00515624; 2 on slides; GBIFCH00592401, GBIFCH00592449; MZL • 15 nymphs; Goré; 06°22'28"N, 06°34'27"W; 26.10.2006; leg. E.O. Edia; 14 in alcohol; GBIF-

CH00515545; 1 on slide; GBIFCH00592738; MZL • 2 nymphs; Loc. Réserve Naturelle Banco, Abidjan, station aval; 18.06.2008; leg. J.-L. Gattolliat and E.O. Edia; on slides; GBIFCH00465139, GBIFCH00465140; MZL • 5 nymphs; Riv. Ehania, Pont Ehania; 05°16'42"N, 02°50'02"W; 12.03.2005; leg. E.O. Edia; 4 in alcohol; GBIFCH00515605; 1 on slide; GBIFCH00592457; MZL. **Other material.** Ivory Coast • 11 nymphs; Loc. Pont Soumié; 05°24'53"N, 03°16'56"W; leg. E.O. Edia; 10 in alcohol; GBIFCH00515612; 1 on slide; GBIFCH00592733; MZL • 14 nymphs; Riv. Ehania, Loc. Affiénou; 05°24'39"N, 02°55'43"W; 04.08.2004; leg. E.O. Edia; 13 in alcohol; GBIFCH00515613; 1 on slide; GBIFCH00592734; MZL.

3. ***Labiobaetis elouardi*** (Gillies, 1993)

Labiobaetis elouardi: Gillies 1993: figs 17–27 (*Baetis elouardi*)

Differential diagnosis. Nymph. Following combination of characters: A) scape with well-developed distolateral process (Fig. 8e); B) labrum rectangular, dorsally with a submarginal arc of peculiar setae (Fig. 8a, h-j); C) mandibles with incisor and kinetodontium apically cleft (Fig. 8b, c); D) glossae much shorter than paraglossae (Fig. 8d); labial palp segment II with broad thumb-like protuberance; E) hind protoptera absent; F) six pairs of gills; G) paraproct with 2–3 stout, marginal spines (Fig. 8f, g).

Examined material. Ivory Coast • 28 nymphs; Abidjan, Banco, Réserve Naturelle; 05°23'17"N, 04°03'13"W; 17.07.2007; leg. E.O. Edia; 24 in alcohol; GBIFCH00515540, GBIFCH00515547; 4 on slides; GBIFCH00592400, GBIFCH00592402, GBIFCH00592405, GBIFCH00592406 • 7 nymphs; Abidjan, Banco, Réserve Naturelle; 05°23'17"N, 04°03'13"W;18.06.2008; leg. J.-L. Gattolliat and E.O. Edia; 6 in alcohol; GBIFCH00515607, GBIFCH00515608; 1 on slide; GBIFCH00592459. Guinea • 3 nymphs; Bas. Cavally, Riv. Cavally, Loc. Mt. Nimba (nord-ouest); 01.02.1988; Coll. ORSTOM; leg. J.-M. Elouard; on slides; GBIFCH00592433, GBIFCH00592434, GBIFCH00592435; all material in MZL.

Distribution. Guinea, Ivory Coast (Fig. 4b).

4. ***Labiobaetis gambiae*** (Gillies, 1993)

Labiobaetis gambiae: Gillies 1993: figs 30–37 (*Baetis gambiae*); Edia et al. 2015

Differential diagnoses. Nymph. Following combination of characters: A) scape without distolateral process; B) labial palp segment II with narrow, thumb-like protuberance, segment III enlarged, slightly pentagonal (Fig. 9b); C) maxillary palp segment II with slight excavation at inner, distolateral margin; D) fore femur rather slender, length ca. 4× maximum width; dorsal margin with ca. eight curved, spine-like setae; femoral patch absent; E) hind protoptera small (Fig. 9a); F) seven pairs of gills.

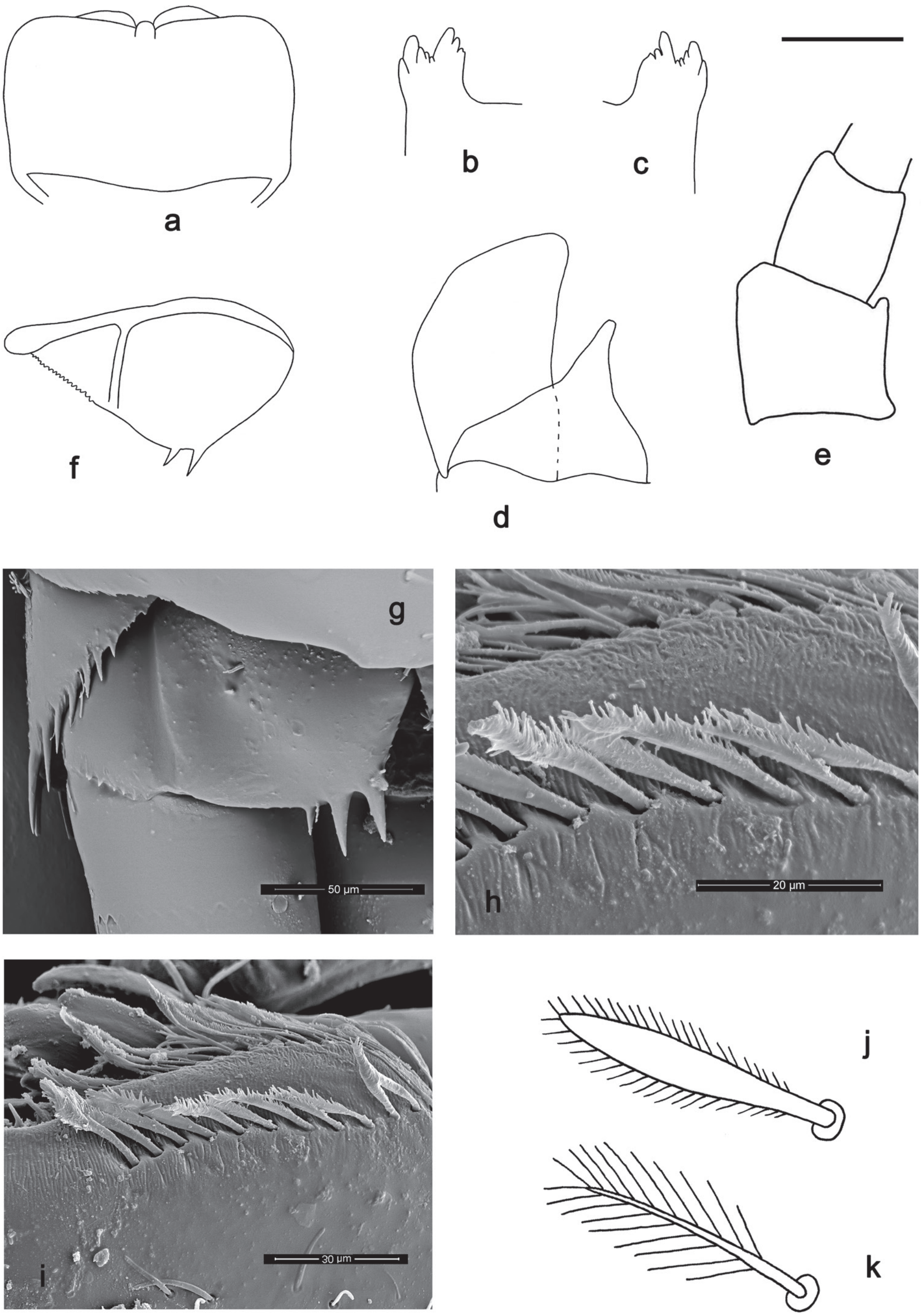

Figure 8. a–i *Labiobaetis elouardi*, nymph morphology **a** labrum **b** incisor and kinetodontium of right mandible **c** incisor and kinetodontium of left mandible **d** glossa and paraglossa **e** base of antenna **f, g** paraproct. SEM photos, Labrum, dorsal surface, right side, submarginal arc of setae (**h** section of figure **i**) **j** seta of submarginal arc on dorsal surface of labrum **k** usual type of feathered seta of submarginal arc on dorsal surface of labrum. Scale bar: 0.1 mm (**h, i**).

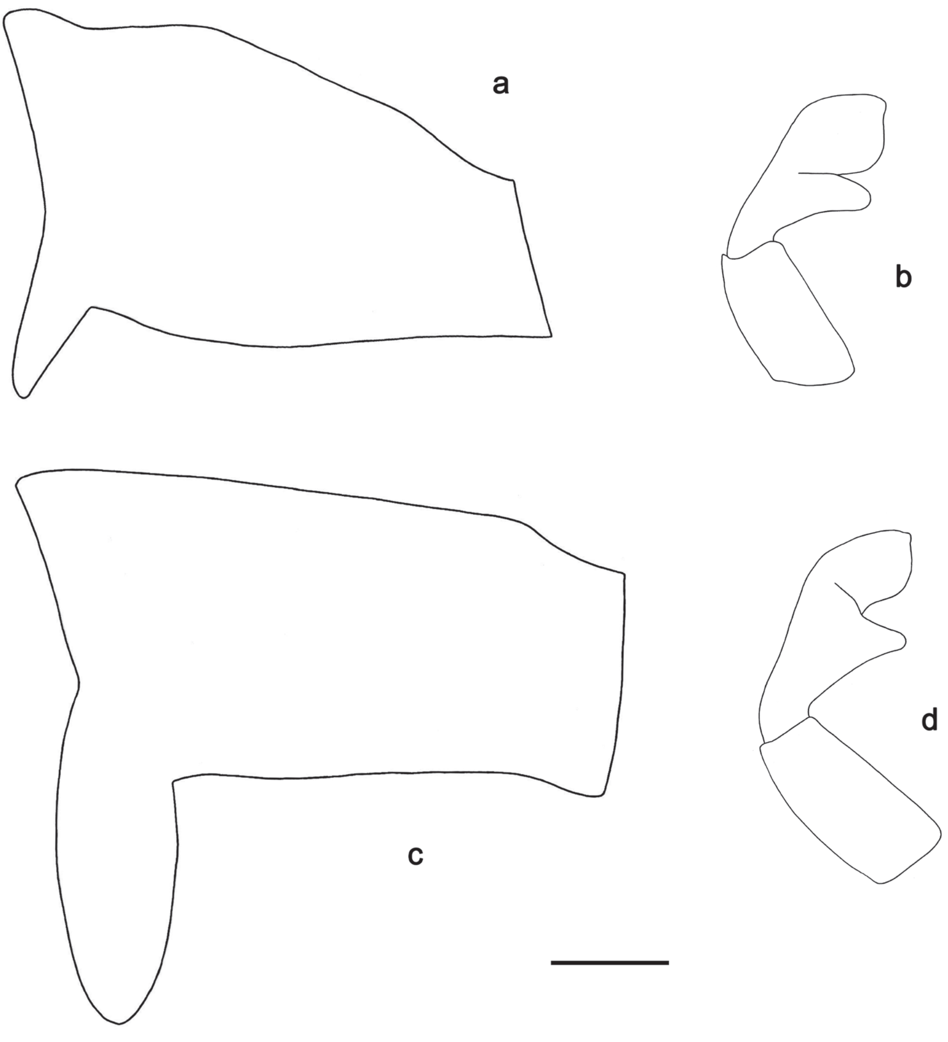

Figure 9. Nymph morphology **a, b** *Labiobaetis gambiae* **a** metanotum (left side), with small hind protopteron (mature nymph) **b** labial palp **c, d** *Labiobaetis piscis* **c** metanotum (left side), with well-developed hind protopteron (mature nymph) **d** labial palp. Scale bar: 0.1 mm.

Material examined. Gambia • 4 nymphs; River Gambia, Wali Kunda; 01.10.1981; on slides; NHM10017019, NHM10017020, NHM10017022, NHM10017023; NHM • 2 nymphs; River Gambia, Wali Kunda; 07.10.1981; on slides; NHM10017021, NHM10017026; NHM • 1 nymph; River Gambia, Wali Kunda; 10.1986; on slide; NHM10017024; NHM. Ivory Coast • 1 nymph; Riv. Eholié, Akakro; 05°28'36"N, 03°08'25"W; 01.10.2003; leg. E.O. Edia; on slide; GBIFCH00592452; MZL • 26 nymphs; Riv. Noé, Loc. M'possa; 05°28'37"N, 02°51'30"W; 30.06.2004; leg. E.O. Edia; 1 on slide; GBIFCH00592731; 25 in alcohol; GBIFCH00515610; MZL • 62 nymphs; Riv. Soumié, Loc. Pont Soumié;

05°24'53"N, 03°16'56"W ; 14.06.2008; leg. J.-L. Gattolliat and E.O. Edia; 1 on slide; GBIFCH00592732; 61 in alcohol; GBIFCH00515611; MZL • 13 nymphs; Grobiakoko; 05°51'18"N, 05°31'00"W; 29.10.2006; leg. E.O. Edia; 1 on slide; GBIFCH00592736; 12 in alcohol; GBIFCH00515616; MZL • 15 nymphs; Niambré; 05°52'46"N, 05°36'55"W; 19.07.2007; leg. E.O. Edia; in alcohol; GBIFCH00515544; MZL • 16 nymphs; Boubo; 05°18'08"N, 04°22'37"W; 19.07.2007; leg. E.O. Edia; 1 on slide; GBIFCH00592737; 15 in alcohol; GBIFCH00515543; MZL • 1 nymph; Goré; 06°22'28"N, 06°34'27"W; 26.10.2006; leg. E.O. Edia; in alcohol; GBIFCH00515618; MZL. MALI • 1 nymph; River Niger, 30 km downstream Bamako, Tyenfala (= Tienfala); 05.02.1986; on slide; NHM10017025; NHM.

Distribution. Gambia, Ivory Coast, Mali (Fig. 4b).

5. ***Labiobaetis glaucus*** **(Agnew, 1961)**

Labiobaetis glaucus: Agnew 1961 (*Baetis glaucus*); Lugo-Ortiz and McCafferty 1997: figs 27–38, 39–50 (*Labiobaetis masai*, *L. nadineae*; formal synonyms, Lugo-Ortiz et al. 2000); Lugo-Ortiz et al. 2000: figs 1–11 (*Pseudocloeon glaucum*); Gattolliat et al. 2018: figs 34–44, 47

Differential diagnosis. Nymph. Following combination of characters: A) scape without distolateral process (Fig. 2e); B) labial palp segment II with broad thumb-like protuberance (Fig. 2f); C) maxillary palp segment II with excavation at inner distolateral margin, segment II ca. 1.5× length of segment I (Fig. 2b, c); D) fore femur mostly rather broad, length 2.7–3.2× maximum width; dorsal margin with 13–18 curved, spine-like setae and often basally some additional setae near margin; femoral patch well developed (Fig. 3b); E) hind protoptera well developed; F) seven pairs of gills; G) paraproct with 5–13 stout, marginal spines.

Examined material. Guinea • 1 nymph; Guinea; Bas. Niger, Riv. Niandan, Loc. Sassambaya; 23.12.1984; Coll. ORSTOM; leg. J-M Elouard; on slide; GBIFCH00592422; MZL. Ivory Coast • 17 nymphs; Loc. Aboisso, Riv. Bia; 05°28'04"N, 03°12'26"W; 14.06.2008; leg. J.-L. Gattolliat and E.O. Edia; 1 on slide; GBIFCH00592407; 16 in alcohol; GBIFCH00515549; MZL • 1 nymph; Pont Soumié; 05°24'53"N, 03°16'56"W; 04.04.2005; leg. E.O. Edia; on slide; GBIFCH00592451; MZL. Mali • 47 nymphs; Bas. Niger, Riv. Niger, Loc. Tienfala (= Tyenfala); 21.03.1985; Coll. ORSTOM; leg. J.-M. Elouard; 44 in alcohol; GBIFCH00515532; 3 on slides; GBIFCH00592396, GBIFCH00592426, GBIFCH00592427; MZL • 9 nymphs; Bas. Sénégal, Riv. Baoule, Loc. Kati-Kita (route); 22.11.1984; Coll. ORSTOM, leg. J.-M. Elouard; 8 in alcohol; GBIFCH00515533; 1 on slide; GBIFCH00592397; MZL • 26 nymphs; Bas. Sénégal, Riv. Baoule, Loc. Missira; 09.10.1984; Coll. ORSTOM, leg. J.-M. Elouard; in alcohol; GBIFCH00515534; MZL • 10 nymphs; Riv. Niger, Sotuba; 16.01.1985; leg. J.-M. Elouard; 9 in alcohol; GBIFCH00515570; 1 on slide; GBIFCH00592416; MZL.

Distribution. Guinea, Ivory Coast, Mali (Fig. 4a), Ethiopia (Kaltenbach and Gattolliat 2021), potentially Iran (Tahmasebi et al. 2020), Angola (Barber-James and Ferreira 2019), Saudi Arabia, Mayotte (Gattolliat et al. 2018), South Africa, Lesotho, Namibia, Kenya (Lugo-Ortiz et al. 2000), Zimbabwe (Harrison and Hynes 1988).

6. *Labiobaetis latus* (Agnew, 1961)

Labiobaetis latus: Agnew 1961 (*Baetis latus*); Lugo-Ortiz and McCafferty 1997: figs 1–13 (*Labiobaetis aquacidus*; formal synonym, Lugo-Ortiz and de Moor 2000)

Differential diagnosis. Nymph. Following combination of characters: A) scape with well-developed distolateral process (Fig. 2g); C) labial palp segment II with broad thumb-like protuberance (Fig. 2f); D) maxillary palp segment II with excavation at inner distolateral margin; E) fore femur rather broad, length ca. 3× maximum width; dorsal margin with 13–18 curved, spine-like setae; femoral patch absent (Fig. 3c); F) hind protoptera well developed; G) seven pairs of gills; H) paraproct with 21–29 stout, marginal spines.

Examined material. Guinea • 2 nymphs; Férédougouba, stat. près confluent, Beya et M'bôo (Riv.6); 09.09.1988; leg. J.-M. Elouard; 1 in alcohol; GBIFCH00515501; 1 on slide; GBIFCH00592375; MZL • 5 nymphs; Bas. Loffa, Riv. Loffa, Loc. Loffa (Mission Agnès); 30.01.1988; ORSTOM; leg. J.-M. Elouard; in alcohol; GBIFCH00592420; MZL • 13 nymphs; Bas. Niger, Riv. Niandan, Loc. Sassambaya; 23.12.1984; Coll. ORSTOM; leg. J.-M. Elouard; 10 in alcohol; GBIFCH00515535, GBIFCH00515569, GBIFCH00515536; 2 on slides; GBIFCH00592421, GBIFCH00592398; MZL • 1 nymph; Riv. Niandan, Loc. Sassambaya; 19.04.1986; leg. J.-M. Elouard; on slide; GBIFCH00592414; MZL; 2 nymphs; Bas. Niger, Riv. Niandan, Loc. Kissidougou-Kankan (route); 26.10.1984; Coll. ORSTOM; leg. J.-M. Elouard; in alcohol; GBIFCH00592418; MZL • 1 nymph; Haute Diani, près Diomandau; 08°55'00"N, 08°07'60"W; 08.03.1988; leg. J.-M. Elouard; in alcohol; GBIFCH00515537; MZL • 1 nymph; Bas. St. Paul (= Diani), Riv. St. Paul, Loc. N'Zébéla; 31.01.1988; Coll. ORSTOM; leg. J.-M. Elouard; in alcohol; GBIFCH00592419; MZL • 1 nymph; Kon Launtau; 28.I.1989; leg. J.-M. Elouard; in alcohol; GBIFCH00515538; MZL. Ivory Coast • 3 nymphs; Lagboayo; 18.07.2007; leg. E.O. Edia; 2 in alcohol; GBIFCH00515539; 1 on slide; GBIFCH00592399; MZL• 2 nymphs; Lagboayo; 27.10.2006; leg. E.O. Edia; in alcohol; GBIFCH00515546; MZL • 23 nymphs; Loc. Pont Ehania, Riv. Ehania; 05°16'42"N, 02°50'01"W; 14.06.2008; leg. Gattolliat and E.O. Edia; in alcohol; GBIFCH00515601; MZL • 2 nymphs; Grobiakoko; 05°51'18"N, 05°31'00"W; 29.10.2006; leg. E.O. Edia; 1 in alcohol; GBIFCH00515617; 1 on slide; GBIFCH00592450; MZL • 3 nymphs;

Grobiakoko; 05°51'18"N, 05°31'00"W; 19.07.2007; leg. E.O. Edia; 2 in alcohol; GBIFCH00515542; 1 on slide; GBIFCH00592739; MZL • 11 nymphs; Riv. Soumié, Loc. Anoblékro; 05°29'44"N, 03°22'15"W; 06.03.2005; leg. E.O. Edia; 10 in alcohol; GBIFCH00515614; 1 on slide; GBIFCH00592735; MZL. Mali • 1 nymph; Bas. Sénégal, Riv. Baoule, Loc. Kati-Kita (route); 22.11.1984; Coll. ORSTOM, leg. J.-M. Elouard; on slide; GBIFCH00592374; MZL.

Distribution. Guinea, Ivory Coast, Mali (Fig. 4c), Ethiopia (Kaltenbach and Gattolliat 2021), South Africa, Kenya (Lugo-Ortiz and McCafferty 1997).

7. *Labiobaetis piscis* Lugo-Ortiz & McCafferty, 1997

Labiobaetis piscis: Lugo-Ortiz and McCafferty 1997: figs 51–62

Differential diagnosis. Nymph. Following combination of characters: A) scape without distolateral process; B) labial palp segment II with narrow, thumb-like protuberance; segment III slightly pentagonal (Fig. 9d); D) maxillary palp segment II with slight excavation at inner distolateral margin; E) fore femur rather broad, length ca. 3× maximum width; dorsal margin with 7–10 curved, spine-like setae; femoral patch absent or rudimentary; F) hind protoptera well developed (Fig. 9c); G) seven pairs of gills; H) paraproct with 35–40 marginal spines.

Examined material. Guinea • 1 nymph; Bas. Cavally, Riv. Cavally, Loc. Mt. Nimba (nord-ouest); 01.02.1988; Coll. ORSTOM; leg. J.-M. Elouard; on slide; GBIFCH00592395; MZL. Ivory Coast • 1 nymph; Abidjan; Banco, Réserve Naturelle; 05°23'17"N, 04°03'13"W; 17.07.2007; leg. E.O. Edia; on slide; GBIFCH00592403; MZL • 7 nymphs; Riv. Soumié, Loc. Anoblékro; 05°29'44"N, 03°22'15"W; 01.09.2003; leg. E.O. Edia; 6 in alcohol; GBIFCH00515548; 1 on slide; GBIFCH00592378; MZL • 1 nymph; Riv. Soumié, Loc. Anoblékro; 05°29'44"N, 03°22'15"W; 06.03.2005; leg. E.O. Edia; on slide; GBIFCH00592453; MZL • 2 nymphs; Riv. Soumié, Loc. Anoblékro; 05°29'44"N, 03°22'15"W; 01.07.2003; leg. E.O. Edia; on slides; GBIFCH00592454, GBIFCH00592377; MZL • 8 nymphs; Loc. Biaka, Riv. Biaka; 05°28'N, 03°11'W; 14.06.2008; leg. J.-L. Gattolliat and E.O. Edia; 7 in alcohol; GBIFCH00515603; 1 on slide; GBIFCH00592458; MZL. Mali • 11 nymphs; Bas. Niger, Riv. Niger, Loc. Tienfala (= Tyenfala); 21.03.1985; Coll. ORSTOM; leg. J.-M. Elouard; 9 in alcohol; GBIFCH00515528, GBIFCH00515530; 2 on slides; GBIFCH00592394, GBIFCH00592415; MZL • 1 nymph; Bas. Niger, Riv. Niger, Loc. Tienfala (= Tyenfala); 26.06.1985; Coll. ORSTOM; leg. J.-M. Elouard; on slide; GBIFCH00592424; MZL.

Distribution. Guinea, Ivory Coast, Mali (Fig. 4c), Angola (Barber-James and Ferreira 2019), potentially Nigeria (Arimoro and Muller 2010), South Africa (Lugo-Ortiz and McCafferty 1997).

8. *Labiobaetis vinosus* (Barnard, 1932)

Labiobaetis vinosus: Barnard 1932 (*Pseudocloeon vinosum*); Kopelke 1980 (*Pseudocloeon tenuicrinitum*; informal synonym, Kluge 2021); Gillies 1994: figs 16–26 (*Baetis spatulatus*; formal synonym, Kluge and Novikova 2016); Lugo-Ortiz and McCafferty 1997: figs 75–86; Kluge and Novikova 2016: figs 113, 122–129, 132, 133 (*L. tenuicrinitus*; informal synonym, Kluge 2021)

Differential diagnosis. Nymph. Following combination of characters: A) scape without distolateral process; B) labial palp segment II with broad, thumb-like protuberance (Fig. 2h); C) maxillary palp segment II with excavation at inner distolateral margin; D) fore femur rather broad, length ca. 3× maximum width; dorsal margin with 8–18 curved, spine-like setae and basally a partial second row of setae; E) hind protoptera absent or minute; F) six pairs of gills.

Examined material. Ivory Coast • 4 nymphs; Loc. Réserve Naturelle Banco, Abidjan, station aval; 05°23'17"N, 04°03'13"W; 18.06.2008; leg. J.-L. Gattolliat and E.O. Edia; on slides; GBIFCH00592404; GBIFCH00592430, GBIFCH00592431, GBIFCH00592432; MZL • 1 nymph; Loc. Pont Soumié, River Soumié; 05°24'53"N, 03°16'56"W; 14.06.2008; leg. J.-L. Gattolliat and E.O. Edia; on slide; GBIFCH00592429; MZL • 1 nymph; Riv. Soumié, Loc. Anoblékro; 05°29'44"N, 03°22'15"W; 01.12.2003; leg. E.O. Edia; on slide; GBIFCH00592428; MZL • 42 nymphs; Riv. Eholié, Loc. Akakro; 05°28'36"N, 03°08'25"W; 03.07.2004; leg. E.O. Edia; 41 in alcohol; GBIFCH00515609, GBIFCH00515606; 1 on slide; GBIFCH00592460; MZL.

Distribution. Ivory Coast (Fig. 4a), Ethiopia (Kaltenbach and Gattolliat 2021), Angola (Barber-James and Ferreira 2019), Uganda (Kluge and Novikova 2016), South Africa (Lugo-Ortiz and McCafferty 1997), Tanzania (Gillies 1994), DR Congo (Kopelke 1980).

Key to the *Labiobaetis* species of West Africa (nymphs)

1	With six pairs of gills	**2**
–	With seven pairs of gills	**4**
2	With distolateral process at scape; labrum rectangular; mandibles with incisor and kinetodontium apically cleft; glossae much shorter than paraglossae; paraproct with two or three spines (Fig. 8a–g)	***L. elouardi***
–	Without distolateral process at scape; labrum subrectangular; mandibles with incisor and kinetodontium fused; glossae somewhat shorter than paraglossae; paraproct with many spines	**3**
3	Labial palp segment II with broad thumb-like, distomedial protuberance (Fig. 2h)	***L. vinosus***
–	Labial palp segment II with narrow thumb-like, distomedial protuberance (Fig. 7h)	***L. ediai* sp. nov.**

4 Labial palp segment II narrow thumb-like (Fig. 9b, d)................................**5**
– Labial palp segment II broad thumb-like (Fig. 2d, f) **6**
5 Hind protoptera small (Fig. 9a); labial palp segment III enlarged (Fig. 9b)..... .... ***L. gambiae***
– Hind protoptera well developed (Fig. 9c); labial palp segment III not enlarged (Fig. 9d) ....***L. piscis***
6 Scape with distolateral process (Fig. 2g); femoral patch at fore femur absent (Fig. 3c) ....***L. latus***
– Scape without distolateral process (Fig. 2e); femoral patch at fore femur well developed (Fig. 3a, b)..7
7 Fore femur length 3.1–4.1× maximal width, dorsally with row of 9–12 spine-like setae (Fig. 3a); maxillary palp segment II with strongly developed, distolateral excavation, segment II 1.8–1.9× length of segment I (Fig. 2a) ....***L. boussoulius***
– Fore femur length 2.7–3.2× maximal width, dorsally with row of 13–18 spine-like setae (Fig. 3b); maxillary palp segment II with distolateral excavation, segment II ca. 1.5× length of segment I (Fig. 2b, c) ....***L. glaucus***

Discussion

Assignment to *Labiobaetis* and affinities

For the assignment of the new species to *Labiobaetis*, we refer to Kluge and Novikova (2014). *Labiobaetis* is characterised by a number of derived characters, some of which are not found in other taxa (Kluge and Novikova 2014): antennal scape sometimes with a distolateral process; maxillary palp two segmented with excavation at inner distolateral margin of segment II, excavation may be poorly developed or absent (Fig. 7g); labium with paraglossae widened and glossae diminished; labial palp segment II with distomedial protuberance (Fig. 7h). The concept of *Labiobaetis* is also based on additional characters, summarised and discussed in Kaltenbach and Gattolliat (2018, 2019). *L. ediai* sp. nov. is morphologically related to *L. vinosus*, sharing the absence of a distolateral process on scape, the absence of hind protoptera and six pairs of gills. The main differences are the narrow distomedial protuberance seen in labial palp segment II (broad in *vinosus*) (Figs 2h, 7h), the number of spine-like setae at the dorsal margin of the fore femur (7–9 in *L. ediai* sp. nov.; 8–18 in *L. vinosus*) and the presence or absence of setae at the apex of the left mola (present in *L. vinosus*, absent in *L. ediai* sp. nov.).

Labiobaetis boussoulius and *L. glaucus*

Labiobaetis boussoulius was described by Gillies (1993), based on imagos, subimagos and nymphs from a single location, the Milo River near Boussoulé in Guinea. The species is very similar to the common and very widespread *L. glaucus*, which is also present in Guinea. Additionally, *L. glaucus* is known to have a very variable nymphal morphology (Lugo-Ortiz et al. 2000). Therefore, we investigated the morphology of *L. boussoulius* in comparison to *L. glaucus*: the male genitalia are indistinguishable (Gillies 1993: fig. 3; Gattolliat et al. 2018: fig. 46), both have a remarkable triangular expansion at the inner margin at the apex of segment I and the base of segment II of the gonostyli; the colouration of the male imago seems to be slightly different, according to the descriptions of Gillies 1993: p. 214 and Gattolliat et al. 2018: p. 97, but the specimen of *L. boussoulius* is from Guinea and the one of *L. glaucus* from Saudi Arabia and the colours may have altered by the long preservation in alcohol before their description; Gillies 1993: p. 214 indicates 0–4 partial cross veins in the pterostigma of the male wing of *L. boussoulius* (Gillies 1993: fig. 1), but the male holotype has four longer cross veins not reaching the subcostal vein and one shorter cross vein, which is the same as in a male of *L. glaucus* from Saudi Arabia (GBIFCH00235731, GenBank MH070317); most characters of the nymph are identical (Gillies 1993: figs 4, 6–12; Gattolliat et al. 2018: figs 34–44; Lugo-Ortiz and McCafferty 1997: figs 27–50; Lugo-Ortiz et al. 2000: figs 1–11). We notice that the maxillary palp of *L. boussoulius* is 2-segmented as usually seen in *Labiobaetis* and not 3-segmented as shown in Gillies 1993: fig. 5. However, we identified four morphological differences in the nymphs, based on the material at our disposal: the maxillary palp of *L. boussoulius* has a more pronounced distolateral excavation at segment II than *L. glaucus* and segment II is longer in comparison to segment I in *L. boussoulius* (1.8–1.9×) than in *L. glaucus* (ca. 1.5×) (Fig. 2a–c); the fore femur of *L. boussoulius* is usually more slender than the one of *L. glaucus* (length 3.1–4.1× maximum width vs. 2.7–3.2×) (Fig. 3a, b); and *L. boussoulius* has less spine-like setae at the dorsal margin of the fore femur (9–12) than *L. glaucus* (13–18).

Gattolliat et al. 2018 published a COI barcode of *L. boussoulius* (GenBank MH070309, GBIFCH00517528), which is different from the one of *L. glaucus*. However, the specimen is from the Ivory Coast and not from Guinea and no material is available for morphological re-investigation. Therefore, the assignment of this sequence to *L. boussoulius* remains uncertain. In conclusion, we continue to consider *L. boussoulius* as a valid species, based on four slight morphological differences of the nymph; but due to the known high variability of *L. glaucus*, we recommend that its status is confirmed with genetic investigations of fresh material of *L. boussoulius* from Guinea and *L. glaucus* from West Africa.

Labiobaetis elouardi

The morphology of *Labiobaetis elouardi* is very atypical for this genus: the labrum is rectangular (Fig. 8a), the setae of the submarginal arc of setae on the dorsal surface of the labrum are feathered with a broad middle part, representing a new type of seta, which was not known, so far, in *Labiobaetis* (Fig. 8h–j), the apex of both mandibles is cleft between incisor and kinetodontium (Fig. 8b, c), the glossae are much shorter than the paraglossae (Fig. 8d) and the paraproct has only two or three strongly developed, marginal spines (Fig. 8f, g). Usually, in *Labiobaetis*, the labrum is much more subrectangular and laterally rounded, the feathered setae on the dorsal surface of the labrum have a slender middle part (Fig. 8k), incisors and kinetodontium are fused till the apex in both mandibles, the glossae are only slightly shorter than the paraglossae (except in a few species, such as the Malagasy species *L. fabulosus* Lugo-Ortiz & McCafferty, 1997) and the paraproct has many and less pronounced marginal spines. The usual type of feathered setae (Fig. 8k) is present in all other Afrotropical species (Lugo-Ortiz and McCafferty 1997; Gattolliat 2001) as well as in the groups *operosus* and *difficilis* from Southeast Asia (Kaltenbach and Gattolliat 2019) and in the group *orientis* from New Guinea (Kaltenbach and Gattolliat 2018).

However, *Labiobaetis* is generally very variable in many characters and there are other species with similar characters in other regions: species of the groups *vallus* and *sumigarensis*, as well as *L. moriharai* Müller-Liebenau, 1984 and *L. paravultuosus* Kaltenbach & Gattolliat, 2018 have a nearly rectangular labrum; an undescribed species from Borneo has similar setae dorsally on the labrum; species of the *vallus* group, as well as *L. bakerae* Kaltenbach & Gattolliat, 2020, *L. pakpak* Kaltenbach & Gattolliat, 2019, *L. baganii* Kaltenbach, Garces & Gattolliat, 2020, *L. delocadoi* Kaltenbach, Garces & Gattolliat, 2020, *L. giselae* Kaltenbach, Garces & Gattolliat, 2020 and *L. mendozai* Kaltenbach, Garces & Gattolliat, 2020, have a slight cleft between the incisor and kinetodontium; and *L. paravitilis* Kaltenbach & Gattolliat, 2018 and *L. fabulosus* also have glossae much shorter than paraglossae. We keep *L. elouardi* in the concept of *Labiobaetis*, because of the presence of a distolateral process at the scape (Fig. 8e), a slight excavation at the inner distolateral margin of maxillary palp segment II, the large distomedial protuberance at labial palp segment II and the presence of a broad subgenital plate between the gonopods, which are all important characters of the genus. Further, *Labiobaetis* is known to have very different types of setae (simple, feathered, clavate, dendritic, lanceolate) forming the submarginal arc on the dorsal surface of the labrum (Kaltenbach et al. 2020: fig. 2a–e).

Distribution of *Labiobaetis* in the Afrotropical realm

In Kaltenbach and Gattolliat 2021, we compared the distribution of *Labiobaetis* species in the Afrotropical realm to Southeast Asia and New Guinea, where the majority of species live. Apart from Madagascar, where all *Labiobaetis* species are endemic to the Island (Gattolliat 2001), some Afrotropical species have a wide or even very wide distribution (*L. glaucus*, *L. latus*, *L. potamoticus* and *L. vinosus*), whereas most species in Southeast Asia and New Guinea are restricted to smaller regions or are endemic to an island. The reason probably lies in the high geographic complexity of the region (islands in Southeast Asia, extreme landscape structure in New Guinea), facilitating allopatric speciation and endemicity (Toussaint et al. 2013, 2014). The huge African continent is, in comparison, geographically less structured, which generally facilitates wider distributions of species. The present study confirms large distribution ranges of some *Labiobaetis* species in the Afrotropical realm: *L. glaucus* is additionally present in Guinea, Ivory Coast and Mali and can be considered as Panafrotropical (except Madagascar), the same probably applies for *L. vinosus* (additionally found in the Ivory Coast) and *L. latus* (additionally found in Guinea, Ivory Coast and Mali) and also *L. piscis* (additionally found in Guinea, Ivory Coast and Mali) have a very large distribution range as well. *Labiobaetis gambiae* seems to have a wider distribution at least in West Africa (known from Gambia, Ivory Coast and Mali) and may have been easily overlooked in other areas due to its close similarity with *L. piscis.* In contrast, *L. boussoulius* and *L. elouardi* seem to be rare and local species, while *L. ediai* sp. nov. is, so far, only known from the Ivory Coast, but it is not rare.

A high number of localities and different habitats have been sampled in West Africa due to the ORSTOM activities in the past (Lévêque et al. 2003), but there are still areas where no collecting has yet been carried out. Additionally, the distribution of *Labiobaetis* species in Africa is often much more widespread than in other regions. Therefore, we may expect a few, but not many, more species to be discovered in West Africa with further collections.

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