

A new species of *Lasioseius* Berlese (Acari: Mesostigmata: Blattisociidae) from Kenya

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Received 29 March 2021 | Accepted 21 May 2021

Published online at www.soil-organisms.de 1 August 2021 | Printed version 15 August 2021

DOI 10.25674/so93iss2id156

Abstract

About forty species of *Lasioseius* have been found in Africa, however surprisingly not one species of blattisociid mite has been recorded from Kenya. In this paper *Lasioseius kichozi* n. sp. collected from soil and litter in Thika, Kenya is described based on the morphology of adult females and males.

Keywords Blattisociidae | Kenya | *Lasioseius* | New species

1. Introduction

According to the Blattisociidae database of Santos et al. (2021) and considering three recently described species (Ma & Lin 2018, Ma et al. 2018, Quintero-Gutiérrez et al. 2020), the genus *Lasioseius* Berlese comprises about 206 valid species. This genus has a worldwide distribution and have been found in different habitats mainly soil, moss, litter, plants and even in association with insects and vertebrates (Moraes et al. 2016, Walter & Lindquist 1997). In Africa about 40 species of *Lasioseius* have been described or reported but none from Kenya (Moraes et al. 2016, Santos et al. 2021). Surprisingly, there is no report of any blattisociid mite species from this country. This paper aims to describe the first blattisociid mite collected in Kenya.

2. Materials and methods

Mites were collected by direct removal from soil and litter under a stereomicroscope and then preserved in ethanol 70%. Specimens were cleared in a mixture of Nesbitt and lactophenol solutions 1:1, and mounted in modified Hoyer's medium as described by Faraji & Bakker (2008). Drawings were made with the aid of a camera lucida (drawing tube) attached to an Olympus phase contrast microscope. All measurements are in micrometers (μm). The mean of the measurements are given followed by the range in parentheses. The setal notations for the idiosoma follow Lindquist & Evans (1965), and leg chaetotaxy follows Evans (1963).

The type specimens are deposited in ANIC = Australian National Insect Collection, CSIRO Entomology, Canberra, Australia; BMNH = Natural History Museum, London; SMNG = Senckenberg Museum of Natural History, Görlitz and OSAL = Ohio State Acarology Collection.

This work was registered with ZooBank under urn:lsid:zoobank.org:pub:83B5DAAE-8306-4B9C-A4AD-069249F19B55.

3. Results

Blattisociidae

Lasioseius Berlese

Lasioseius kichozi Faraji, n. sp.

(Figs. 1–4, Plate 1)

Diagnosis based on female – Dorsal shield with 36 pairs of setae, mostly tricarinate; setae j_1 and z_1 present; seta z_1 simple; seta r_4 over half as long as s_4 ; sternal shield with anteriomedian patch of reticula, club- or torch-shaped; first pair of sternal setae on sternal shield; ventrianal shield wider than long with four pairs of opisthogastric setae in addition to circumanal setae; with two pairs of metapodal plates separated from each other; anterior margin of tectum denticulate; movable cheliceral digit tridentate and fixed cheliceral digit with 12–14 teeth; major duct relatively wide leading to calyx, sclerotized and bulge; leg I shorter than dorsal shield; tarsus leg II with seta pl_2 almost reaching setae al_1 or pl_1 ; leg IV with two macrosetae (pd_3 of basitarsus and pd_2 of tarsus).

Description

Adult Female – Six specimens measured.

(Figs. 1, 2A, 2C–D, 2F–G, 3 & Plate 1)

Dorsal idiosoma (Fig. 1A) – Dorsal shield 429 (423–438) long and 236 (231–244) wide at j_6 level, oval with moderate waist at r_5 setae, reticulated entirely; with 36 pairs of dorsal setae (podonotal and opisthonotal regions with 21 and 15 pairs of setae, respectively); most of dorsal shield setae tricarinate except for z_1 , s_2 and r_2 short, smooth and aciculate; setae S_4 , S_5 , Z_3 , Z_4 and Z_5 distally serrate; lengths: j_1 24–25, j_2 30 (28–33), j_3 31–32, j_4 29 (28–30), j_5 28–29, j_6 30 (29–31), J_1 32–33, J_2 34 (33–35), J_3 32–33, J_4 32–33, J_5 11 (10–12), z_1 14 (13–15), z_2 31–32, z_3 35–36, z_4 34–35, z_5 27–28, z_6 34 (32–35), Z_1 35–36, Z_2 36–37, Z_3 40 (38–41), Z_4 49 (47–51), Z_5 57 (55–60), s_1 28 (26–29), s_2 12 (11–13), s_3 36, s_4 37 (36–38), s_5 37 (36–38), s_6 39 (38–40), S_1 58 (36–39), S_2 39–40, S_3 40–41, S_4 46–47, S_5 49 (47–51), r_2 21–22, r_3 47, r_4 29 (28–30), r_5 38 (35–40), r_6 28 (27–30), R_1 27–28, R_2 24–25, R_3 24–25, R_4 22–23, R_5 24, R_6 24–25, setae r_3 – R_6 on lateral integument; dorsal shield with 7 pairs of solenostomes (gd_1 , gd_2 , gd_4 , gd_5 , gd_6 , gd_8 , gd_9) and 16 pairs small poroids.

Peritreme and peritrematal shield – Peritrematal shield slightly reticulated fused anteriorly with dorsal shield and extending posteriorly behind coxa IV, weakly sclerotized (Fig. 3E); peritreme extending forward to level of setae j_1 (Fig. 1A).

Ventral idiosoma (Figs. 1B & 1C) – Tritosternum (Fig. 1B) 101 (95–106) long with laciniae free for ca. half of the length; presternal area weakly sclerotized with a few

striae; sternal shield punctate over most of surface with a few lateral striae, posterior margin slightly concave, 97 (96–98) long and 82 (80–86) wide at level of setae St_2 , with anteriomedian patch of reticula, club- or torch-shaped (Plate 1A), with three pairs of setae and two pairs of lyrifissures (iv_1 and iv_2), St_1 34 (33–36), St_2 34 (33–35), St_3 30–31, St_4 situated on the sternal shield but exactly at the anterior margin; metasternal setae St_4 25–25 and a pair of pores (iv_3) on small suboval platelets; endopodal strips situated between coxae III–IV and anterior part of genital shield; genital shield punctate, width at widest point 68 (66–73), St_5 23–24; two pairs of metapodal shields, primary 21–22 X 10 and accessory 13–16 X 5–6; ventrianal shield with transverse striae and finely punctate, length 143–144, width at level of setae Zv_2 (widest point) 174 (168–178), and width at level of paranal setae 94–95; with four pairs of preanal setae (Jv_1 22–23, Jv_2 24–25, Jv_3 25–27, Zv_2 24–25); six pairs of setae surrounding ventrianal shield on integument all simple except Jv_5 tricarinate (Jv_4 24–25, Jv_5 55 (54–56), Zv_1 20–21, Zv_3 16–17, Zv_4 20–21, Zv_5 35–38), five pairs of pores surrounding ventrianal shield; paranal setae 22–23 and postanal seta 28.

Spermathecal apparatus – Major duct relatively wide leading to calyx 8–10 long, sclerotized and bulge but slightly narrowing and suddenly faring distally (Fig. 2D, Plate 1B).

Gnathosoma – Corniculi well sclerotized and horn-like, internal malae lanceolate and densely fimbriated with apices reaching the same level as the tip of corniculi; fixed cheliceral digit 41 long with 12–14 teeth (apical hook is not considered) and a short pilus dentilis; movable digit 44 long tridentate (Fig. 2A, Plate 1C). Deutosternum with eight transverse rows, the most distal one smooth, the other seven with connected rows of denticles, the proximal two rows slightly wider, each with 7–16 denticles (Fig. 2C); subcapitular setae h_3 32–33 slightly longer than h_1 28–29, h_2 16–18 and pc 33–34; palpus 127 (125–128) long with normal chaetotaxy (Evans, 1964).

Legs – Legs I–IV with paired claws and rounded pulvilli, lengths of legs: leg I 411 (405–423), leg II 330 (305–345), leg III 319 (316–320), leg IV 449 (443–459), leg I shorter than dorsal shield and leg IV longer; all setae aciculate, setation of legs I–II–III–IV: coxae 2–2–2–1, trochanters 6–5–5–5, femora 12–11–6–6, genua 13 (2 3/1 3/2 2) – 11(2 3/1 2/1 2) – 9 (2 2/1 2/1 1) – 9 (2 2/1 3/0 1), tibiae 13 (2 3/2 3/1 2) – 10 (2 3/1 2/1 1) – 8 (2 2/1 1/1 1) – 10 (2 2/1 2/1 2), tarsus II–IV 3 3/2 3/2 3+mv,md; tarsus leg II with seta pl_2 almost reaching setae al_1 or pl_1 , leg IV with two macrosetae: basitarsus with seta pd_3 56 (53–58) and tarsus with seta pd_2 53 (52–54) longer than all leg setae.

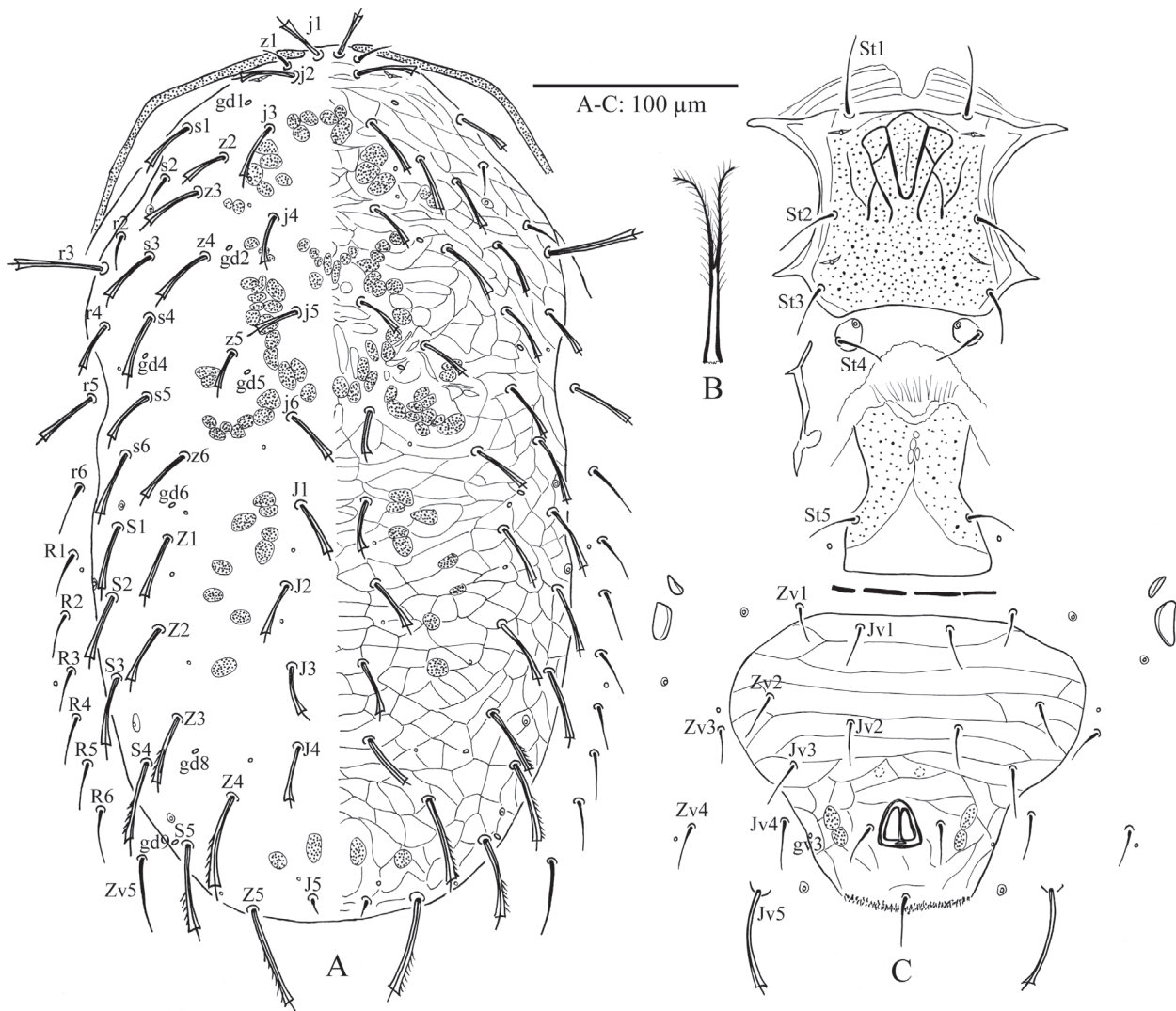


Figure 1. *Lasioseius kichozi* Faraji, n. sp. (Female): (A) Idiosoma, dorsal view; (B) Idiosoma, ventral view; (C) Tritosternum.

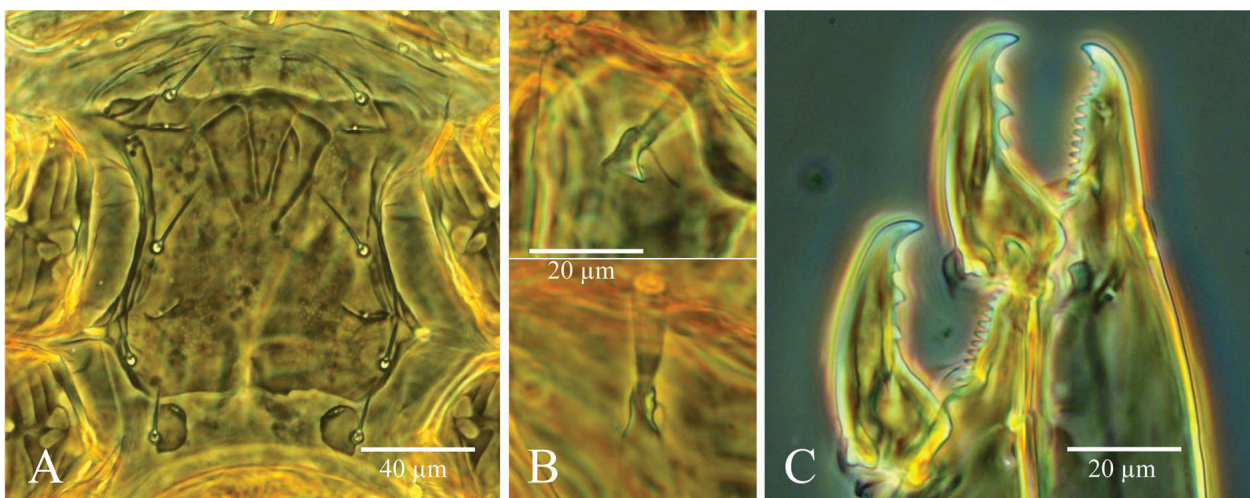


Plate 1. *Lasioseius kichozi* Faraji, n. sp. (Female): (A) Sternal shield; (B) Spermathecae II; (C) Chelicerae.

Adult male – Four specimens measured.
(Figs. 2B, 2E & 4)

Dorsal idiosoma (Fig. 4A) – Dorsal shield 324 (313–330) long and 196 (189–205) wide at j_6 level, oval and reticulated entirely, with 38 pairs of dorsal setae (podonotal and opisthonotal regions with 23 and 15 pairs of setae, respectively); most of dorsal shield setae tricarinate except for z_1 , s_2 , r_2 and r_6 short, smooth and aciculate; setae S_4 , S_5 , Z_3 , Z_4 and Z_5 distally serrate; lengths: j_1 19 (18–20), j_2 21 (19–22), j_3 27–28, j_4 22–23, j_5 23–24, j_6 24 (23–25), J_1 25 (24–26), J_2 26 (25–27), J_3 26 (25–27), J_4 26–27, J_5 6–7, z_1 11–12, z_2 25 (24–26), z_3 28 (27–29), z_4 27–28, z_5 21–22, z_6 27–28, Z_1 27–28, Z_2 29 (28–30), Z_3 32–33, Z_4 40 (38–42), Z_5 46 (44–48), s_1 21–22,

s_2 9–10, s_3 29 (28–31), s_4 29 (28–31), s_5 29 (27–31), s_6 31 (30–33), S_1 29 (28–30), S_2 30–31, S_3 32–33, S_4 35 (33–36), S_5 35 (33–37), r_2 18 (17–19), r_3 36 (35–37), r_4 24 (23–25), r_5 30 (28–32), r_6 18–19, R_1 18–19, R_2 18 (17–19), R_3 16–17, R_4 16–17, R_5 16, R_6 16, setae R_1 – R_6 on lateral integument; adenotaxy of dorsal shield as in female.

Peritreme and peritrematal shield – As in female.

Ventral idiosoma (Fig. 4B) – Tritosternum 70 (68–71) long with laciniae free for ca. half of the length; presternal area weakly sclerotized with a few transverse lines; sternogenital shield punctate over most of surface with a few lateral striae, 141 (137–145) long and 70 and 41–42 wide at level of setae St_2 and St_3 , respectively, with five pairs of setae and three pairs of lyrifissures, St_1 28, St_2 22–23, St_3 22–23, St_4 55–17,

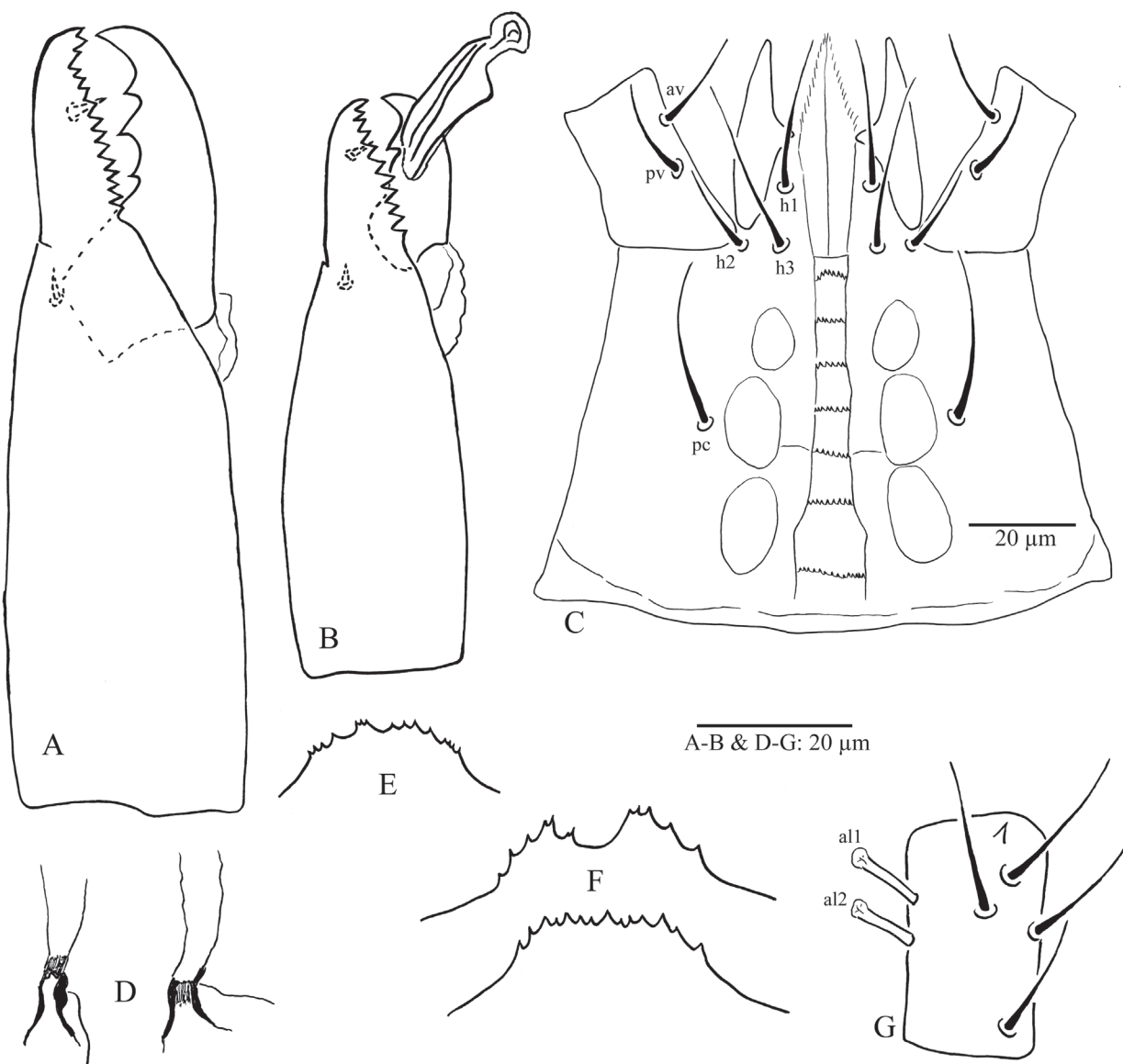


Figure 2. *Lasioseius kichozi* Faraji, n. sp. (Female): (A) Chelicera; (C) Hypostome; (D) Spermathecae; (F) Tectums; (G) Palp genu. (Male): (B) Chelicera; (E) tectum.

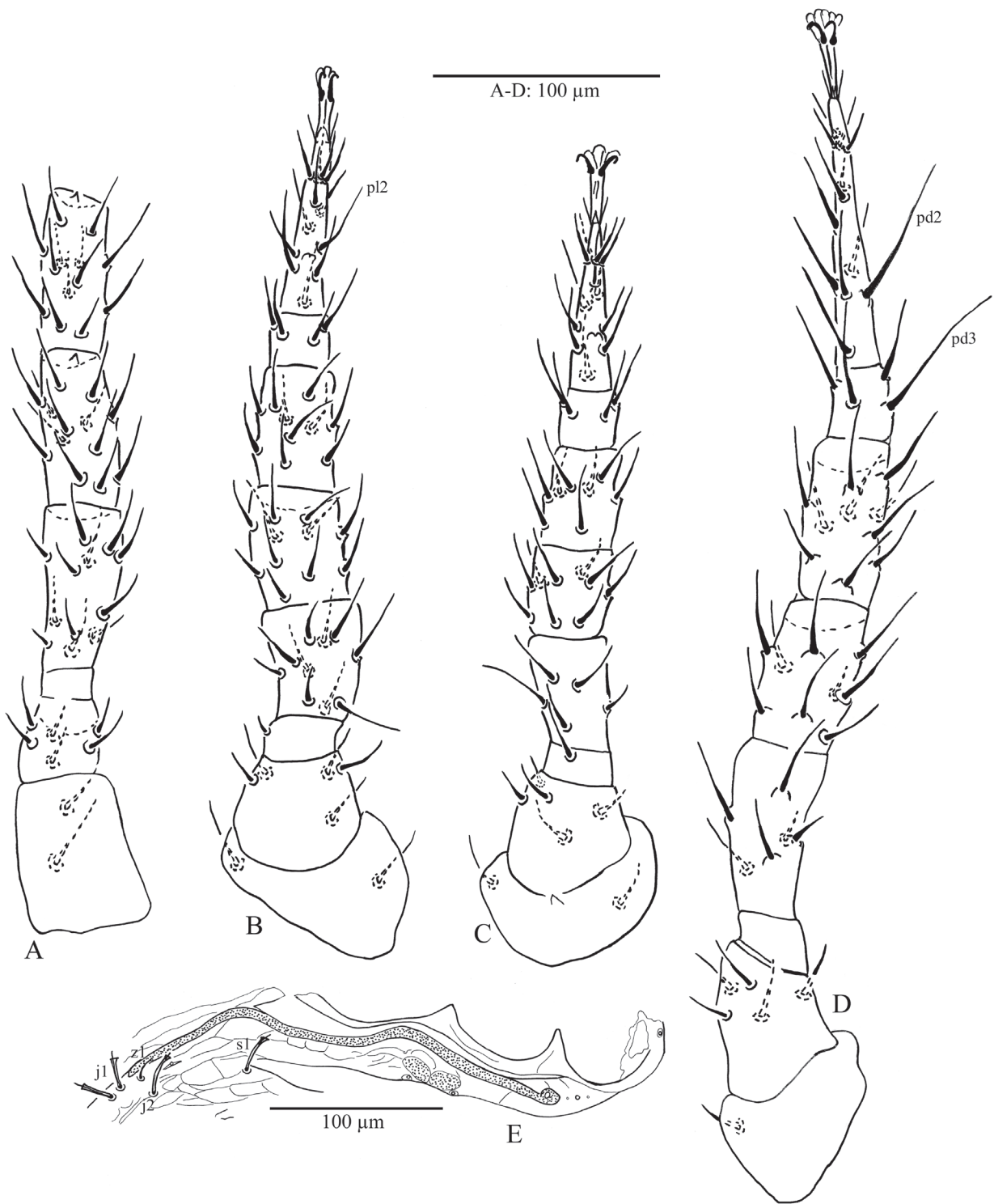


Figure 3. *Lasioseius kichozi* Faraji, n. sp. (Female): (A) Leg I (tarsus not depicted); (B) Leg II; (C) Leg III; (D) Leg IV; (E) Peritreme, peritremal plate and exopodal plate.

St_3 15–16; ventrianal shield with transverse striae and finely punctate, length 126–127, width at level of setae Zv_2 (widest point) 176 (172–188), and width at level of paranal setae 98–99; with six pairs of preanal setae

(Jv_1 16–17, Jv_2 19–20, Jv_4 21–22, Jv_5 34–35, Zv_1 17, Zv_2 19); one pair of setae surrounding ventrianal shield on integument all simple (Zv_3 21–24); paranal setae 16–17 and postanal seta 20–21.

Gnathosoma – Corniculi and internal malae as in female; fixed cheliceral digit 25–26 long with 9–11 teeth (apical hook is not considered) and a short pilus dentilis; movable digit 29–30 long with a single tooth (Fig. 2B); Spermatodactyl stout 25–26 long, ending in knob-like process with a ventral subapical spur. Deutosternum structures as in female except; subcapitular setae h_1 23–24, h_2 13–14, h_3 24–25 and pc 24–25; palpus 117–18 long; anterior margin of tectum denticulated (Fig. 2E)

Legs – Leg IV longer than leg I and leg III slightly shorter than leg II, lengths of legs: leg I 328 (323–330), leg II 268 (258–278), leg III 253 (245–258), leg IV 350 (330–363), tarsus leg II with seta pl_2 26–27 long; leg IV with two macrosetae: basitarsus with seta pd_3 45 (43–46) and tarsus with seta pd_2 40 (36–44) longer than all leg setae; setation and form of setae on legs I–IV as in female.

Etymology – The specific name *kichozi* refers to the farm's name where the new species was found. The name “Kichozi” is an old Swahili name for sunbird.

Type material and depository – Fourteen females and five males, 20 September 2017, soil and litter, Thika, Kenya (1°01'43.5”S 37°02'19.5”E), collector: Henry Wainwright; Holotype female, two paratype females and one paratype male deposited in SMNG; three paratype females and one paratype male deposited in ANIC; three paratype females and one paratype male deposited in BMNH; two paratype females and one paratype male deposited in OSAL.

Remarks – *Lasioseius kichozi* n. sp. is distinct from all the species of *Lasioseius* by its unique shape of sternal patch of reticula. It resembles *L. zerconoides* Willmann (1954), which is distributed in some European countries in many respects by having most of dorsal shield setae

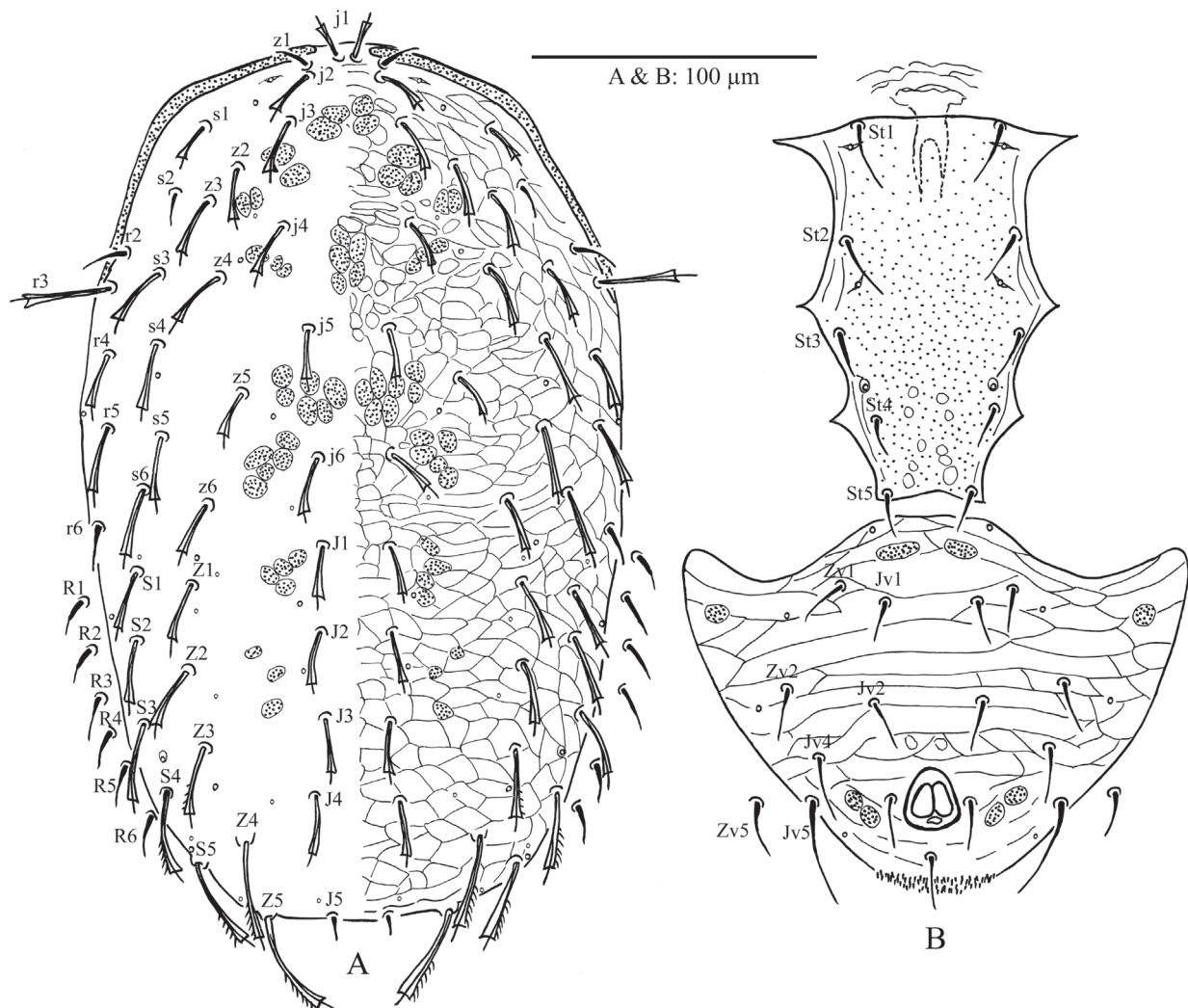


Figure 4. *Lasioseius kichozi* Faraji, n. sp. (male): (A) Idiosoma, dorsal view; (B) Idiosoma, ventral view.

tricarinate, seta r_4 over half as long as s_4 ; first pair of sternal setae on sternal shield; ventrianal shield wider than long with four pairs of opisthogastric setae in addition to circumanal setae and leg I shorter than dorsal shield. The new species differs from *L. zerconoides* by having patch of reticula on sternal shield club- or torch-shaped while later species has an oval patch of reticula with net pattern. Some features of the new species are shorter than those of *L. zerconoides*: dorsal shield length 423–438 vs 570–590, leg IV 443–459 vs 520–530, Z_4 47–51 vs 60, Z_5 55–60 vs 75, S_4 47–51 vs 60. Two species described by Karg (1976, 1994), *L. bilineatus* from Chile and *L. cortisimilis* from Galapagos do also show resemblances to the new species. *Lasioseius bilineatus* has three macrosetae (70–95) long on leg IV, fixed digit of chelicera with about 21 teeth and sternal reticula with two parallel lines while the new species has two macrosetae (52–58) long on leg IV, fixed digit of chelicera with 12–14 teeth and sternal reticula club- or torch-shaped. *Lasioseius cortisimilis* with first pair of sternal setae located on presternal area, no macroseta on leg IV and sternal reticula with an oval patch of net pattern while the new species has first pair sternal setae on sternal shield, two macrosetae on leg IV and sternal reticula club- or torch-shaped.

4. Discussion

For *Lasioseius* classification, Christian & Karg (2006) presented five subgenera (*Borinquolaelaps*, *Crinidens*, *Cuspiacus*, *Endopodalius*, *Lasioseius*), while Moraza & Lindquist (2018) divided it into two subgenera (*Endopodalius*, *Lasioseius*). In a key to the species-groups of subgenus *Lasioseius* (*Lasioseius*), Moraza & Lindquist (2018) included three previously described species groups, namely, *phytoseioides*-group *sensu* Lindquist (1964) and de Moraes et al. (2015), *porulosus*-group *sensu* Walter & Lindquist (1997) and *floridensis*-group *sensu* Mineiro et al. (2009), described a new species group of *cassidini*-group and left room for possible undescribed species groups. Based on the morphological features of the new species described in this paper, it would key out to the undescribed species groups. Using the keys of Christian & Karg (2006), the described species would have belonged to the subgenus *Crinidens* and then to the *ometes*-complex.

A revision of the species groups of the subgenus *Lasioseius* (*Lasioseius*) is still required as descriptions of some species lack important information, especially about the legs and spermathecal apparatus. Therefore, re-descriptions of those species are essential.

5. Acknowledgements

I would like to thank Dr Henry Wainwright for providing me mite material described in this paper. Drs Edward Albert Ueckermann and Henry Wainwright kindly critically reviewed the manuscript.

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