



Species of the subtribes Arrenoseiina and Proprioseiopsina (Tribe Amblyseiini) and the tribe Typhlodromipsini (Acari: Phytoseiidae) from sub-Saharan Africa

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Abstract

This is the fourth publication of a series to determine the phytoseiid mites of sub-Saharan Africa. Twenty-six phytoseiid species of the subtribes Arrenoseiina Chant & McMurtry (5 species) and Proprioseiopsina Chant & McMurtry (9 species), and tribe Typhlodromipsini Chant & McMurtry (12 species), are reported in this paper. They refer to all species of these taxa known to occur in sub-Saharan Africa. Eight of these species are described for the first time, 14 species are redescribed and 4 are not evaluated in this study. Most of those species were collected in cassava habitat in tropical Africa and in other habitats in South Africa. Keys are included to help in the separation of the species in each tribe or subtribe.

Key words: Biological control, predator, cassava, taxonomy

Introduction

Cassava is one of the most important food crops grown in sub-Saharan Africa. The Neotropical mite pest *Mononychellus tanajoa* (Bondar), the cassava green mite, was first reported in East Africa in the early 1970's, from where it quickly spread to most sub-Saharan African countries where cassava is widely cultivated (Yaninek 1988). In the early 1980's, the International Institute of Tropical Agriculture (IITA) initiated a program to control *M. tanajoa* biologically (Yaninek & Herren 1988). To evaluate the composition of native phytoseiids, IITA personnel conducted surveys in cassava habitats in several sub-Saharan African cassava-growing countries before and after the introduction of exotic phytoseiids from the Neotropics for the control of that pest. This paper is the fourth of a series dealing with the identification of phytoseiid mites found in those surveys. The first paper dealt with species of the genus *Euseius* (Moraes *et al.* 2001b), the second with the species in subtribes Typhlodromalina and Euseiina (Moraes *et al.* 2006), and the third with the species of the genus *Neoseiulus* (Zannou *et al.* 2006).

The objective of the present paper is to report the phytoseiids of the subtribes Arrenoseiina Chant & McMurtry and Proprioseiopsina Chant & McMurtry, belonging to the Amblyseiini, and of the tribe Typhlodromipsini Chant & McMurtry. Redescriptions of known species and descriptions of new species are based mostly on specimens found in the cassava surveys previously reported, with the addition of specimens collected by South African researchers. Keys are given to help separate the species reported.

Setal nomenclature is that of Rowell *et al.* (1978) and Chant & Yoshida-Shaul (1991) for dorsal and ventral surfaces of the idiosoma, respectively. Idiosomal setal patterns are those of Chant & Yoshida-Shaul (1992). All measurements are given in micrometers; each measurement corresponds to the average for the number of individuals indicated for each sex of each species, followed (in parentheses) by the respective ranges (if measurement is variable). For some of the redescribed species, measurements of type specimens are provided; in those cases, if measurements of specimens collected in this study are also provided, then the measurements of the types are shown in brackets. Dorsal shield width was always taken at the widest level of the

proscutum and ventrianal shield width at level of anus was always taken at the middle part. Macrosetae for which measurements are not provided should be considered as absent. Abbreviations used for depositories of type specimens are: ESALQ-USP (Escola Superior de Agricultura Luiz de Queiroz, Universidade de São Paulo, Piracicaba-SP, Brazil); IITAIM (International Institute of Tropical Agriculture, Insect Museum; Cotonou, Republic of Benin) and NCA-PPRI (National Collection of Arachnida, PPRI, Pretoria, South Africa). World distribution of each species is based on the surveys corresponding to the present work and on Moraes *et al.* (2004).

Tribe Amblyseiini

Amblyseiini, Wainstein, 1962: 26.

Chant & McMurtry (2004a) gave a full description of this Amblyseiinae tribe. Diagnostic characters used for this tribe (Chant & McMurtry, 2006) are: idiosoma with more than 25 pairs of setae, ratio between the length of seta s4 and that of seta Z1 greater than 3.1 (except for the species of *Paraamblyseius* Muma), seta S4 present, dorsal shield entire, peritrematal shield fused anteriorly to the dorsal shield, sternal shield without median posterior projection and genua II and III usually with macrosetae.

Subtribe Arrenoseiina Chant & McMurtry

Arrenoseiina, Chant & McMurtry, 2004a: 220.

Chant & McMurtry (2004b) gave a full description of this subtribe. Diagnostic characters used are: brownish to reddish in color, strong sclerotization of the idiosomal shields, broad and rotund dorsal shield, seta J2 usually present (if absent, then seta j5 also absent), sternal and ventrianal shields usually wider than long and peritrematal shield with ectal strip.

Of the 5 genera belonging to this subtribe (Chant & McMurtry, 2004b), only *Phytoscutus* Muma is known to occur in sub-Saharan Africa.

Phytoscutus Muma

Phytoscutus Muma, 1961: 275; Yoshida-Shaul & Chant, 1997: 221; Chant & McMurtry, 2004b: 305; Moraes *et al.*, 2004: 165.

Amblyseius (*Phytoscutella*), Ehara & Bhandhufalck, 1977: 73.

Amblyseius (*Trochoseius*), Ueckermann & Loots, 1985: 129.

Iphiseius (*Trochoseius*) Pritchard & Baker, 1962: 299.

Phytoscutella Muma, 1961: 275.

Trochoseius, Matthysse & Denmark, 1981: 341.

Stable characters mentioned by Chant & McMurtry (2004b) for species of this genus are: j5 absent; peritreme extending forward to level of j1; peritrematal shield very robust posteriorly; sternal shield with 3 pairs of sternal setae; preanal pores distinct; atrium of spermatheca small. Males with 3 pairs of preanal setae.

Five species of this genus are reported in this paper. They have female idiosomal setal pattern 9A:6E/JV-3:ZV-3, except *Phytoscutus eugenus* (Ueckermann & Loots), whose setal pattern is 9A:6E/JV-3,4:ZV-3; all setae smooth, except for *P. glomus* (Pritchard & Baker) in which Z5 is very lightly barbed; J2, S2 and S4 absent; r3 and R1 inserted on interscutal membrane; Jv5 inserted on the soft cuticle; chaetotaxy of genua II and III 2–2/0, 2/0–1 and 1–2/1, 2/0–1, respectively.

***Phytoscutus eugenus* (Ueckermann & Loots)**

(Fig. 1)

Amblyseius (Trochoseius) eugenus Ueckermann & Loots, 1985: 130.

Phytoscutus eugenus, Yoshida-Shaul & Chant, 1997: 231; Chant & McMurtry, 2004b: 309; Moraes *et al.*, 2004: 165.

Female. (Specimen measured. Angola: holotype)

Dorsum. Dorsal shield smooth, 441 long and 302 wide. Setae j1 [28], j3 [72], j4 [9], j6 [9], J5 [9], z2 [82], z4 [25], z5 [9], Z1 [19], Z4 [186], Z5 [227], s4 [173], S5 [9], r3 [13], R1 [13].

Venter. Sternal shield smooth, posterior margin concave; distances between St1-St3 [54], St2-St2 [66]. Genital shield striate; distance between St5-St5 [95]. Ventrianal shield reticulate, pentagonal, anterior margin straight, [176] long, [183] wide at level of Zv2 and [151] wide at level of anus, with 3 pairs of preanal setae (Jv1, Jv2 and Zv2; only one member of Jv4 present); Zv1 on soft cuticle; Jv5 long [189]; preanal pores posteromesad to Jv2. With 1 pair of metapodal shields.

Chelicera. Movable digit [28]; fixed digit [25] (because of the position, it is not possible to count the number of teeth).

Spermatheca. Calyx cup-shaped, [6] long.

Legs. Sharp-tipped macrosetae; Sge I [50], Sge II [32], Sge III [63], Sti III [50], Sge IV [101], Sti IV [88], St IV [95].

Specimens examined. Angola: Salazar, holotype, on *Eugenia uniflora*, 18-IV-1972, M.K.P. Smith Meyer.

World distribution. Angola.

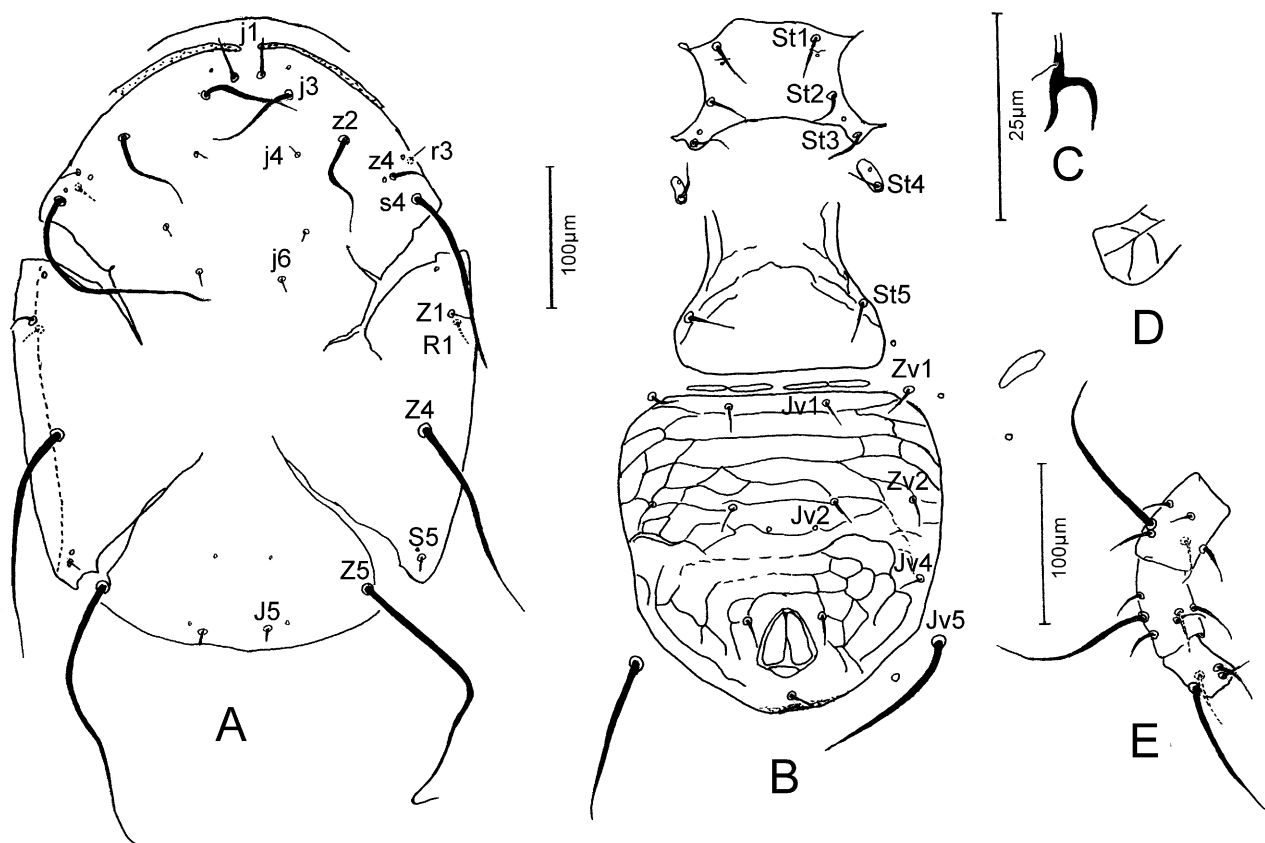


FIGURE 1. *Phytoscutus eugenus* (Ueckermann & Loots) (female): A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Peritremal shield; E. Leg IV.

***Phytoscutus glomus* (Pritchard & Baker)**

(Fig. 2)

Iphiseius (Trochoseius) glomus Pritchard & Baker, 1962: 299.

Amblyseius (Trochoseius) glomus, Ueckermann & Loots, 1985: 129.

Phytoscutus glomus, Yoshida-Shaul & Chant, 1997: 232; Chant & McMurtry, 2004b: 309; Moraes *et al.*, 2004: 165.

Female. (Specimen measured. Democratic Republic of Congo: holotype)

Dorsum. Dorsal shield smooth, [371] long and [285] wide. Setae j1 [32], j3 broken, j4 broken, j6 [more than 13], J5 [10], z2 broken, z4 [18], z5 [5], Z1 [44], Z4 broken, Z5 [136], s4 [145], S5 [6], r3 [8], R1 [6].

Venter. Sternal shield reticulate laterally; posterior margin concave; distances between St1-St3 [54], St2-St2 [72]. Genital shield reticulate; distance between St5-St5 95. Ventrianal shield reticulate, pentagonal, anterior margin straight, [172] long, [180] wide at level of Zv2 and [168] wide at level of anus; with 3 pairs of pre-anal setae (Jv1, Jv2 and Zv2); Jv4 and Zv1 on soft cuticle; Jv5 short [21]; preanal pores posteromesad to Jv2. With 1 pair of metapodal shields.

Chelicera . Not possible to measure movable and fixed digits and to count their teeth.

Spermatheca . Calyx funnel-shaped, [10] long.

Legs. Sharp-tipped macrosetae; Sge II [22], Sge III [36], Sti III [31], Sge IV [64], Sti IV [48], St IV [41].

Specimens examined. Democratic Republic of Congo (Belgian Congo): Lwiro, holotype, on an ornamental tree, 18-V-1955, E.W. Baker.

Remarks. No additional specimens of this species were collected in this study.

World distribution. Democratic Republic of Congo, Kenya and Zimbabwe.

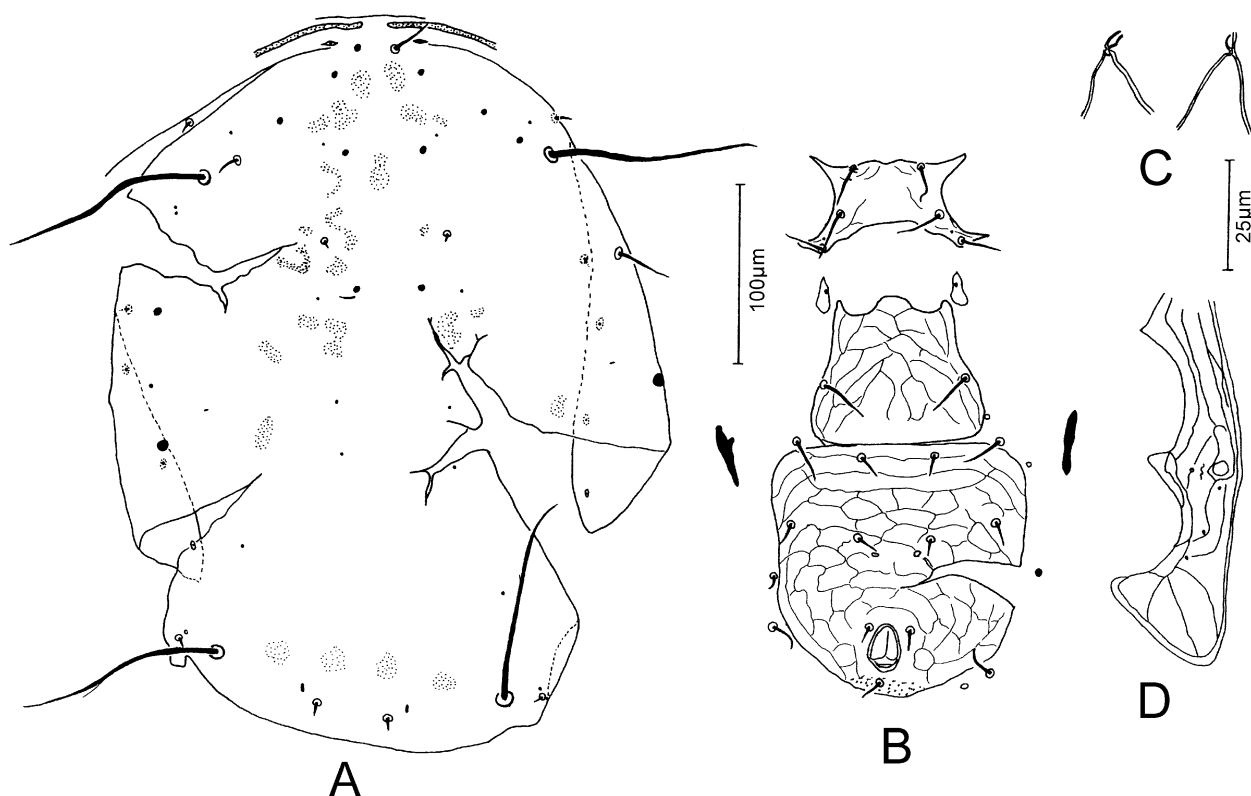


FIGURE 2. *Phytoscutus glomus* (Pritchard & Baker) (female): A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Peritremal shield.

***Phytoscutus gongylus* (Pritchard & Baker)**

(Fig. 3)

Iphiseius (*Trochoseius*) *gongylus* Pritchard & Baker, 1962: 304.

Amblyseius (*Trochoseius*) *gongylus*, Ueckermann & Loots, 1985: 129.

Phytoscutus gongylus, Yoshida-Shaul & Chant, 1997: 231; Chant & McMurtry, 2004b: 309; Moraes *et al.*, 2004: 165.

Trochoseius gongylus, Matthyse & Denmark, 1981: 341.

Female. (Specimens measured. Cameroon: 2; Ghana: 1; Nigeria: 1; Uganda: 2; Zambia: 1; Democratic Republic of Congo: holotype)

Dorsum. Dorsal shield mostly smooth, with few undulating transverse striae between setae Z4, 399(368–456) [379] long and 332(304–368) [321] wide. Setae j1 28(24–32) [30], j3 61(53–69) [60], j4 7(6–8) [4], j6 16(11–19) [14], J5 9(8–11) [12], z2 9(8–11) [10], z4 18(14–22) [17], z5 8(6–10) [4], Z1 37(30–43) [30], Z4 174(168–187) [166], Z5 203(192–216) [197], s4 158(149–171) [167], S5 13(10–16) [17], r3 9(5–11) [8], R1 6 [6].

Venter. Sternal shield smooth posterior margin concave; distances between St1–St3 54(50–58) [54], St2–St2 65(61–69) [62]. Genital shield reticulate; distance between St5–St5 104(101–110) [95]. Ventrianal shield reticulate, anterior margin concave, lateral and posterior margins forewing a semicircle, 165(142–184) [158] long, 239(208–256) [223] wide at the level of Zv2 and 136(122–158) wide at level of anus, with 5 pairs of preanal setae (Jv1, Jv2, Jv4, Zv1 and Zv2); Jv5 short (24); preanal pores mesad and slightly anterior to Jv2. With 1 pair of metapodal shields, each with a protuberance on the inner margin, suggesting the fusion of a large, laterad and a small, mesad shield.

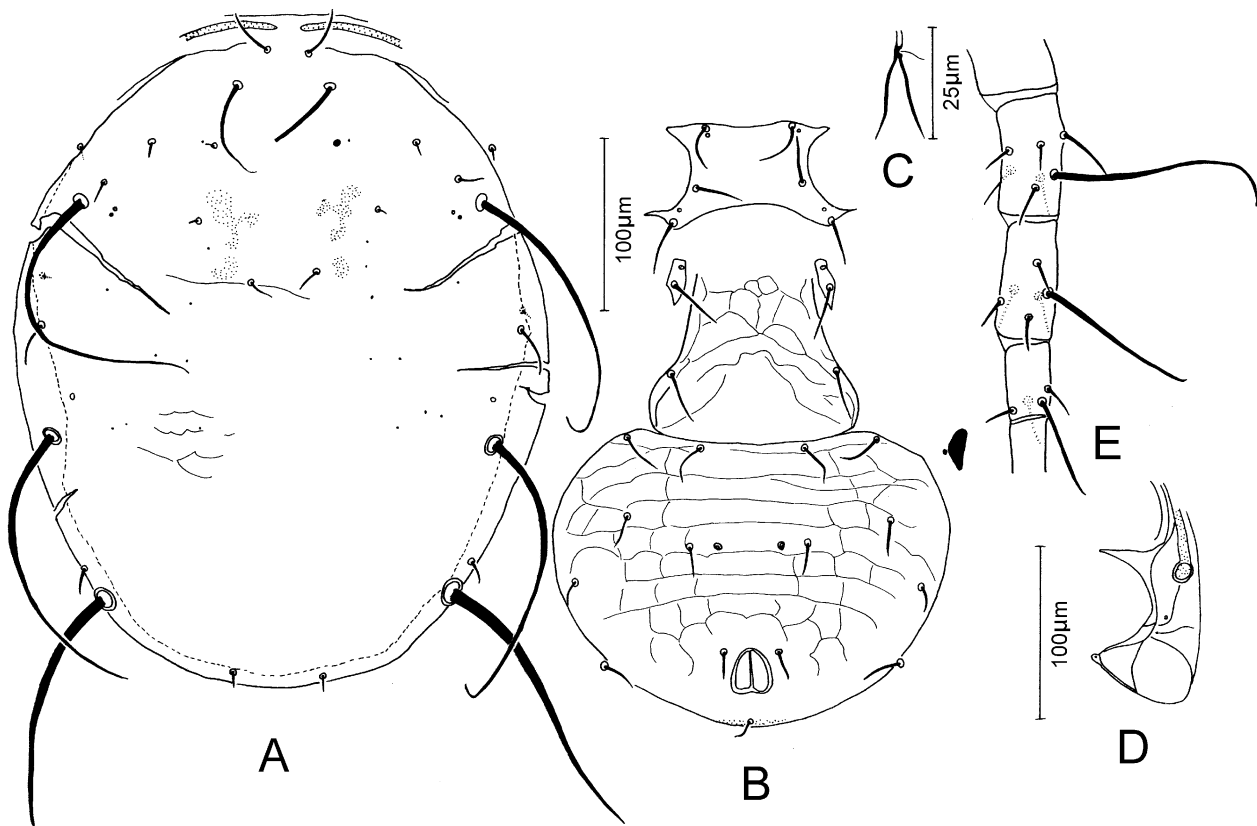


FIGURE 3. *Phytoscutus gongylus* (Pritchard & Baker) (female): A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Peritremal shield; E. Leg IV.

Chelicera. Movable digit 27(26–28) [27] long, with 3 [3] teeth; fixed digit 19(18–19) long, with 8 [apparently 7] teeth and a *pilus dentilis*.

Spermatheca. Calyx funnel-shaped, 15(11–19) long.

Legs. Sharp-tipped macrosetae; Sge I 30(26–35), Sge III 37(32–40) [36], Sti III 27(24–32), Sge IV 69(62–78) [66], Sti IV 48(42–58) [54], St IV 48(40–54) [48].

Specimens examined. Cameroon: 1 km S Yangamo, on *Cassia* sp., 02-II-1991, L. Louis. Democratic Republic of Congo (Belgian Congo): Stanleyville, on *Vitex congolensis*, 18-IV-1955, E.W. Baker. Ghana: Senchi, on unknown plant, 13-XI-1989, G.J. de Moraes. Nigeria: 4 km S Elele, on *Alchornea cordifolia*, 15-IV-1992, A. Onzo. Uganda: Rachai, 34 km S Masaka, on *Coffea* sp., 05-X-1990, J.S. Yaninek. Zambia: 84 km S Kasama, on *Brachystegia boehmii*, 16-VI-1992, J.S. Yaninek.

Remarks. Differently from the holotype, the specimens collected in this study have macrosetae on genu I and tibia III.

World distribution. Cameroon, Democratic Republic of Congo, Ghana, Kenya, Madagascar, Nigeria, Sierra-Leone, Uganda and Zambia.

***Phytoscutus lienoulouisi* Moraes, Zannou & Oliveira, n. sp.**

(Fig. 4)

Diagnosis. This species is characterized by having seta z2 more than twice as long as z4; seta j4 at about the same level as z2; sternal shield totally reticulate; Zv1, Jv4 and Jv5 on integument.

Female. (2 specimens measured)

Dorsum. Dorsal shield mostly smooth, with few undulating transverse striae between setae Z4, 435 long and 315 wide. Setae j1 36(34–38), j3 65(62–67), j4 8, j6 13, J5 11, z2 79(77–82), z4 30(29–32), z5 8, Z1 29, Z4 186(182–189), Z5 236(235–237), s4 194(173–216), S5 8, r3 8, R1 8.

Venter. Sternal shield reticulate; posterior margin concave; distances between St1–St3 54, St2–St2 72. Genital shield reticulate, distance between St5–St5 91. Ventrianal shield reticulate, anterior margin straight, lateral and posterior margins rounded, 176 long, 177(173–181) wide at widest level and 158 wide at level of anus, with 3 pairs of preanal setae (Jv1, Jv2, Zv2); Jv4 and Zv1 on soft cuticle; Jv5 long (104); preanal pores mesad and slightly posterior to Jv2. With 1 pair of metapodal shields.

Chelicera. Movable digit 27 long, with 2 teeth; fixed digit 18 long, with 7 teeth and a *pilus dentilis*.

Spermatheca. Calyx funnel-shaped, 14 long.

Legs. Sharp-tipped macrosetae; Sge I 53, Sge III 62, Sti III 61, Sge IV 104(98–110), Sti IV 94(91–96), St IV 77.

Locality and type material. Holotype female from *Mangifera indica*, 5 km N Muyuka, Cameroon, 09-II-1991, L. Louis, deposited at ESALQ-USP. One paratype female from unknown plant, 12 km N Obala, Cameroon, 05-II-1991, L. Louis, deposited at ESALQ-USP.

Etymology. This new species is named after Liéno Louis, a Cameroonian acarologist involved in the collections of most of the phytoseiids from Cameroon treated in this paper.

Remarks. This species falls into the *gongylus* species group. Indeed, its characters fit those of this species group.

Phytoscutus glomus (Pritchard & Baker, 1962) differs from this new species by having z2 and z4 much shorter and the central area of the sternal shield smooth. *Phytoscutus eugenus* differs from this new species by having sternal shield smooth, striate genital shield and by lacking Jv4 (or Jv4 is on the ventrianal shield; see redescription of *P. eugenus* previously presented in this paper). *Phytoscutus reunionensis* (Ueckermann & Loots, 1985) differs from this new species, by having z2, Z4, Z5 and s4 at least 35% shorter than in the new species and sternal shield smooth.

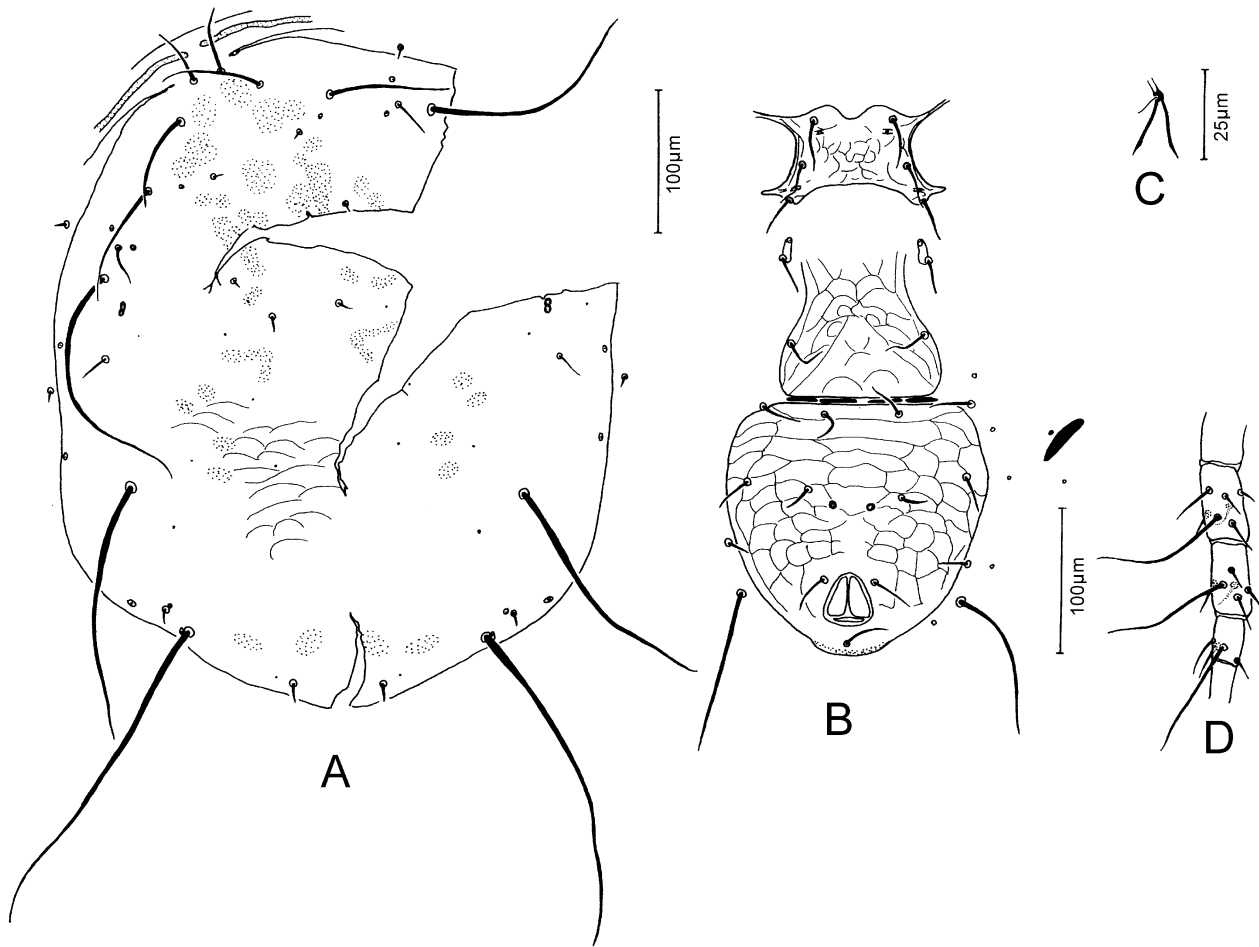


FIGURE 4. *Phytoscutus lienoulouisi* Moraes, Zannou & Oliveira, n. sp. (female): A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Leg IV.

***Phytoscutus wiesei* (Ueckermann & Loots)**

(Fig. 5)

Amblyseius (Trochoseius) wiesei Ueckermann & Loots, 1985: 133.

Phytoscutus wiesei, Yoshida-Shaul & Chant, 1997: 229; Chant & McMurtry, 2004b: 309; Moraes *et al.*, 2004: 167.

Female. (Specimens measured. Uganda: 5; Angola: holotype)

Dorsum. Dorsal shield mostly smooth, with some undulating transverse striae between Z1 and Z4, 425(408–443) [403] long and 362(352–384) [302] wide. Setae j1 28(26–34) [32], j3 57(37–77) [69], j4 7(6–8) [9], j6 19(18–21) [13], J5 10(8–11) [13], z2 10(10–11) [9], z4 13(10–16) [16], z5 9(8–11) [9], Z1 86(58–139) [139], Z4 251(243–259) [239], Z5 319(302–331) [296] s4 236(216–259) [230], S5 15(11–19) [25], r3 8(5–11) [9], R1 10(8–13) [9].

Venter. Sternal shield mostly smooth, with some rare lateral striae; posterior margin concave; distances between St1–St3 59(56–62) [54], St2–St2 73(72–74) [63]. Genital shield reticulate; distance between St5–St5 116(110–122) [101]. Ventrianal shield reticulate, lateral and posterior margins rounded, 203(200–206) [192] long, 295(269–344) [290] wide at the level of Zv2 and 218(213–225) [214] wide at level of anus, with 5 pairs of preanal setae (Jv1, Jv2, Jv4, Zv1 and Zv2); JV5 short (31 long); preanal pores mesad and about in line with setae Jv2. With 2 pairs of metapodal shields, 1 of which is much smaller than the other.

Chelicera. Movable digit 27(27–28) [25] long, with 3–4 [4] teeth; fixed digit 19(18–20) [22] long, with 8 [7] teeth and a *pilus dentilis*.

Spermatheca. Calyx funnel-shaped, 17(14–19) [13] long.

Legs. Sharp-tipped macrosetae; Sge I 56 [57], Sge III 77 [73], Sti III 43 [44], Sge IV 112 [126], Sti IV 86 [91], St IV 56 [69].

Specimens examined. Angola: Salazar, from *Eugenia uniflora*, 18-IV-1972, M.K.P. Smith Meyer. Uganda: 34 km S Masaka, Rakai District, *Coffea* sp., 05-X-1990, J.S. Yaninek; Nsambya, Rakai District, *Mangifera indica*, 06-X-1990, B. Odongo; 1 km N Muzizi River, Hoima, *Artocarpus heterophyllus*, 10-X-1990, J.S. Yaninek.

Remarks. The holotype of this species has a single pair of metapodal shields, instead of 2 as in the specimens from Uganda, collected in this study; in the latter specimens, those shields are distinctly separate in some specimens, but partially fused in others. Considerable variation in setal lengths was observed between specimens collected in Uganda within and between sites/hosts, and even between right and left sides of one of the specimens. Specimens from 1 km N Muzizi River, Hoima, have setae j3 and Z1 much shorter than those of the holotype and of the specimens from the other sites however it was not considered as a new species because of the high variation in setal lengths observed in some specimens of *P. wiesei* in Uganda.

World distribution. Angola, Liberia and Uganda.

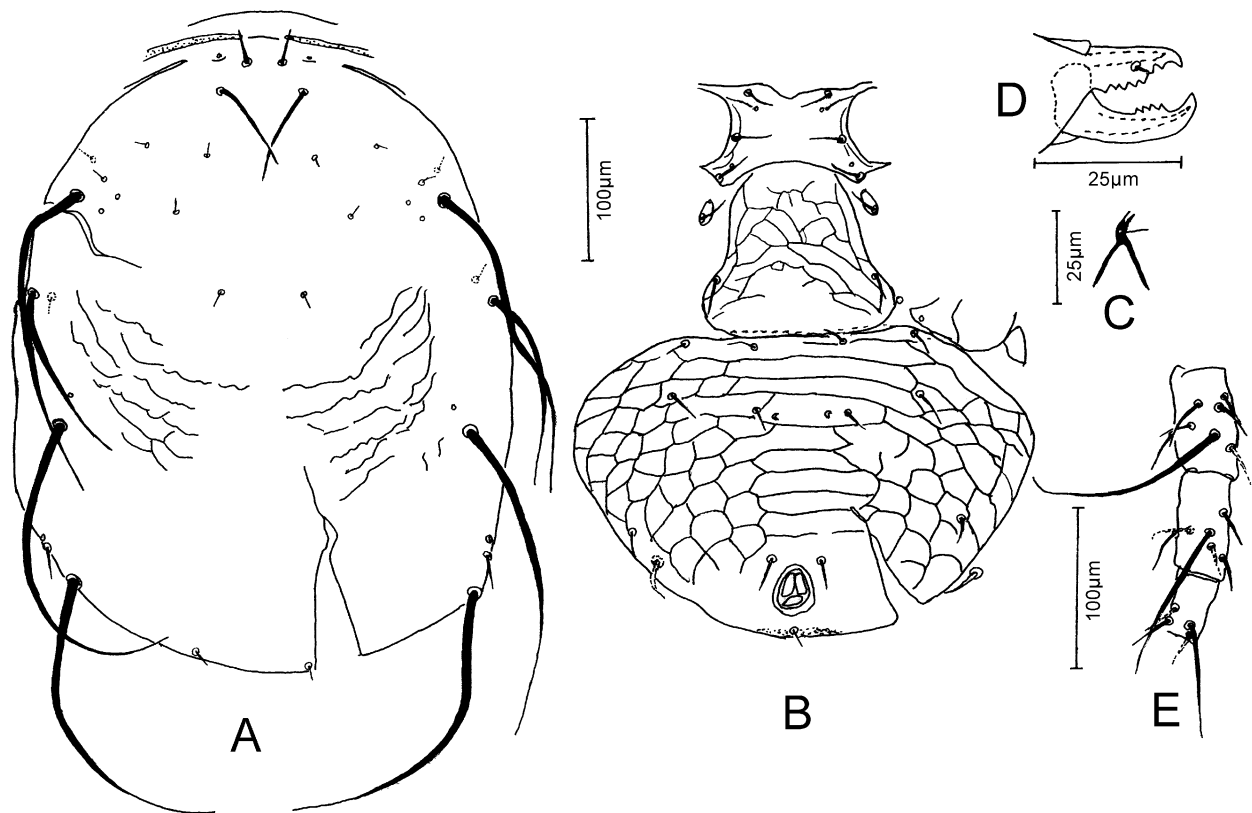


FIGURE 5. *Phytoscutus wiesei* (Ueckermann & Loots) (female): A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Chelicera; E. Leg IV.

Key to the species of *Phytoscutus* treated in this paper

- 1 Calyx of spermatheca cup-shaped *P. eugenus* (Ueckermann & Loots)
- Calyx of spermatheca funnel-shaped..... 2

- 2 Jv4 and Zv1 off ventrianal shield 3
 - Jv4 and Zv1 on ventrianal shield 4
 3 j4 at about same level as z2; Z5 longer than distance between their bases; sternal shield totally reticulate *P. lienoulouisi* **n. sp.**
 - j4 at about same level as z4; Z5 shorter than distance between their bases; sternal shield only laterally reticulate *P. glomus* (Pritchard & Baker)
 4 Z1 more than 0.9 as long as the distance between its base and the base of Z4 *P. wiesei* (Ueckermann & Loots)
 - Z1 less than half as long as the distance between its base and the base of Z4 *P. gongylus* (Pritchard & Baker)

Subtribe *Proprioseiopsina* Chant & McMurtry

Chant & McMurtry (2005a) gave a full description of this Amblyseiini subtribe. Diagnostic characters are: seta j5 present; seta J2 absent; sternal and ventrianal shields usually wider than long; peritrematal shield with or without ectal strip.

Of the 5 genera belonging to this subtribe (Chant & McMurtry, 2005a), only *Proprioseiopsis* Muma is known to occur in sub-Saharan Africa.

Proprioseiopsis Muma

Proprioseiopsis Muma, 1961: 277 (in part, type species only); Moraes *et al.*, 2004: 170; Chant & McMurtry, 2005a: 9.

Phytoseiulella Muma, 1961: 276 (in part, type species only).

Amblyseiulus Muma, 1961: 278 (in part, type species only).

Amblyseius (*Pavlovskius*) Wainstein, 1962: 12 (in part, type species only).

Amblyseius (*Skironodromus*) Wainstein, 1962: 12 (in part, type species only).

Amblyseius (*Proprioseiopsis*), Van der Merwe, 1968: 161.

Iphiseius (*Phytoseiulella*), Van der Merwe, 1968: 109.

Noeledius Muma & Denmark, 1968: 232 (in part, type species only).

Proprioseiopsis (*Amblyseiulus*) Karg, 1983: 303.

Proprioseiopsis (*Patinoseius*) Karg, 1983: 303.

Proprioseiopsis (*Proprioseiopsis*) Karg, 1983: 303 (in part).

Proprioseiopsis (*Skironodromus*) Karg, 1983: 303.

Proprioseiopsis (*Tuboseius*) Karg, 1983: 303.

Stable characters mentioned by Chant & McMurtry (2005a) for species of this genus are: female idiosomal setal pattern 10A:8E/JV-3:ZV (J2 absent), except *Proprioseiopsis atrichos* **n. sp.**, in which this pattern is: 10A:7E/JV-3:ZV (S4 absent); peritreme extending forward to level of j1; sternal shield with 3 pairs of sternal setae; 2 pairs of metapodal shields; 3 pairs of preanal setae and a pair of preanal pores. Males with 3 to 6 pairs of preanal setae.

Nine species of this genus are reported in this paper. They have tan to brown color and setae r3 and R1 inserted on interscutal membrane.

Proprioseiopsis atrichos Moraes, Zannou & Oliveira, **n. sp.**

(Fig. 6)

Diagnosis. This new species is characterized by having z2 shorter than the distance between its base and the

base of z4; z4 longer than the distance between its base and the base of s4; s4 as long as Z4, and both longer than Z5; sternal and genital shields smooth; Jv5 smooth; and by lacking S4.

Female. (1 specimen measured).

Dorsum. Dorsal shield smooth, 389 long and 233 wide. Setae j1 21, j3 35, j4 2, j5 2, j6 2, J5 8, z2 13, z4 74, z5 2, Z1 10, Z4 86, Z5 64, s4 88, S2 11, S5 11, r3 14, R1 11. Setae smooth, except Z4 and Z5 which are serrate; S4 absent.

Venter. Sternal shield mostly smooth, with some rare lateral striae; posterior margin concave; distances between St1-St3 53, St2-St2 80. Genital shield smooth, with 3 pairs of distinct, elongate muscle scars; distance between St5-St5 106. Ventrianal shield pentagonal, with transverse striae and 2 pairs of distinct, roundish muscle scars, anterior margin slightly concave, 115 long, 110 wide at level of Zv2 and 106 wide at level of anus, preanal pores small and posteromesad to Jv2. Two pairs of metapodal shields. Ventral setae smooth.

Chelicera. Movable digit 33 long, apparently with 1 tooth; fixed digit 29 long, apparently with 5 teeth and a *pilus dentilis*.

Spermatheca. Calyx cup-shaped 10 long; atrium distinct.

Legs. Sharp-tipped macrosetae; Sge III 26, Sge IV 53, Sti IV 40, St IV 72. Chaetotaxy: genu II: 2-2/1,2/0-1: genu III: 1-2/1,2/0-1.

Male. Unknown.

Locality and type material. Holotype female from *Citrus* sp., Luwero, Kyankonwa, Uganda, 05-X-1990, J.S. Yaninek, deposited at ESALQ-USP.

Etymology. The epithet *atrichos* refers to the absence of seta S4 on the dorsal shield of the type of this new species.

Remarks. The characters of this species fit those of the genus *Proprioseiopsis*, except the absence of S4 that separate this species from the other *Proprioseiopsis* species.

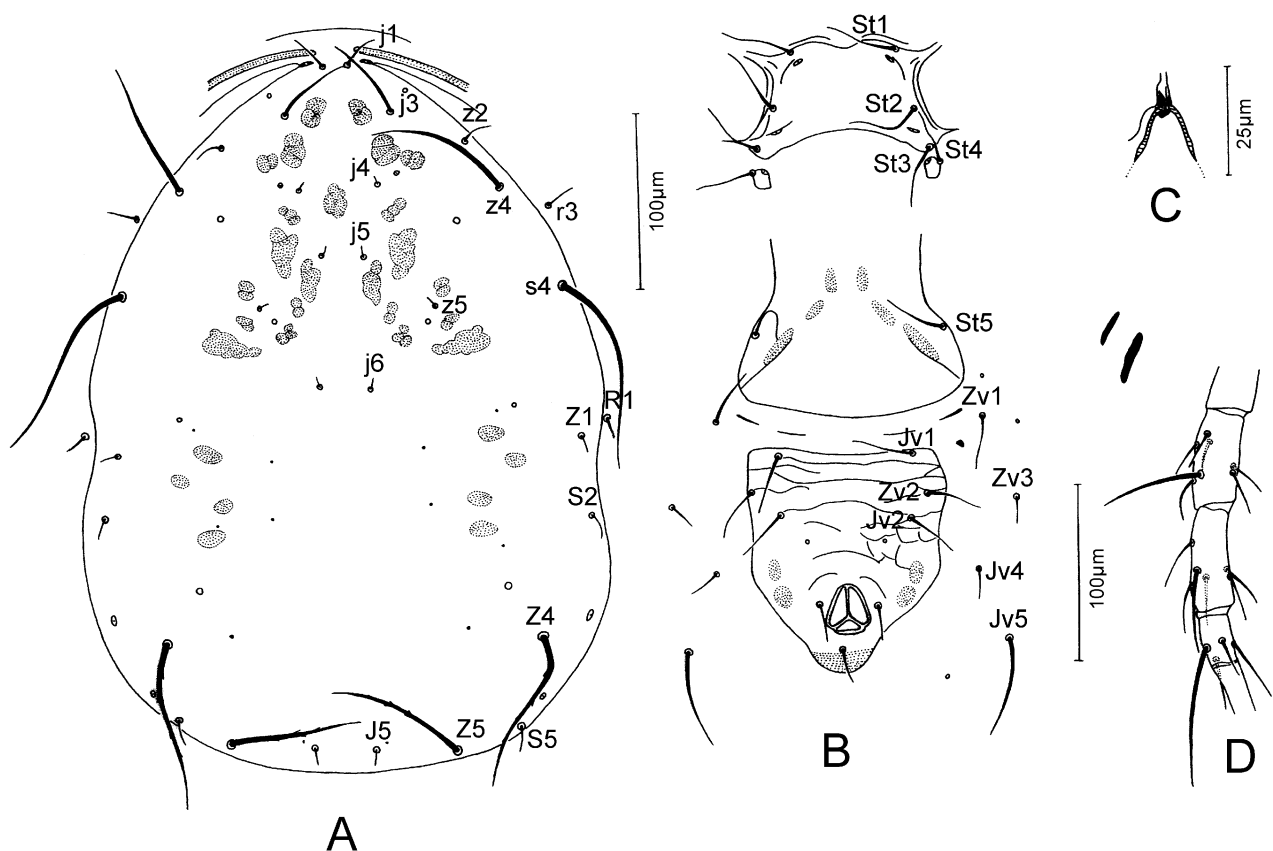


FIGURE 6. *Proprioseiopsis atrichos* Moraes, Zannou & Oliveira, n. sp. (female): A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Leg IV.

***Proprioseiopsis brachydactylus* Moraes, Zannou & Oliveira n. sp.**

(Fig. 7)

Diagnosis. Species characterized by having dorsal shield smooth; seta Z5 slightly longer than setae z4, Z4 and s4; setae z4, Z4, Z5, s4 and Jv5 smooth; z2 and z4 about as long as distances between their bases and the bases of the setae next behind; sternal shield smooth; ventrianal shield pentagonal, smooth, longer than wide at level of Zv2, fixed digit not more than half the length of those in other *Proprioseiopsis*.

Female. (2 specimens measured).

Dorsum. Dorsal shield smooth, 334(326–341) long and 238(218–259) wide. Setae j1 21, j3 54(50–59), j4 6, j5 6, j6 12(11–13), J5 8, z2 46(43–50), z4 64(59–69), z5 6, Z1 10, Z4 68(64–72), Z5 81(74–88), s4 81(80–82), S2 29(21–37), S4 22(14–30), S5 26(22–30), r3 37(34–40), R1 6(5–6). All setae smooth.

Venter. Sternal shield smooth, posterior margin concave; distances between St1–St3 54(53–56), St2–St2 64(62–66). Genital shield smooth; distance between St5–St5 70(67–72). Ventrianal shield pentagonal, smooth, anterior margin slightly convex, 109(106–112) long, 97(96–98) wide at level of Zv2 and 83(78–88) wide at level of anus, preanal pores well posterior and slightly mesad to Jv2. Ventral setae smooth.

Chelicera. Movable digit short, 16(15–17) long, with 1 tooth; fixed, very short, 13 long, with 2 teeth and a *pilus dentilis*.

Spermatheca. Calyx cup-shaped 7(5–8) long 9(7–10) in diameter at its distal extreme; atrium appressed to the base of the calyx.

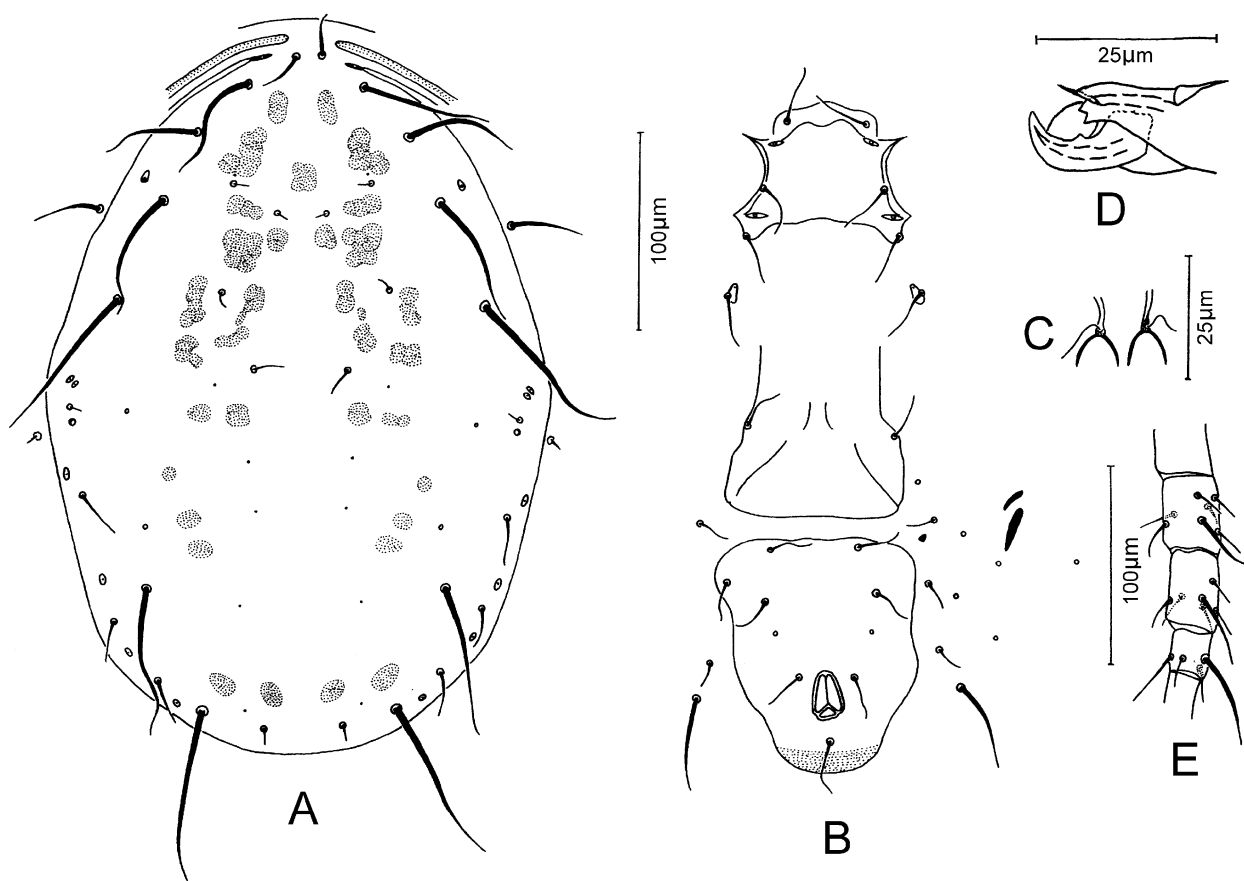


FIGURE 7. *Proprioseiopsis brachydactylus* Moraes, Zannou & Oliveira n. sp. (female): A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Chelicera; E. Leg IV.

Legs. Sharp-tipped macrosetae; Sge I 29(27–30), Sge II 28(22–34), Sge III 25(24–26), Sti III 20(18–23), Sge IV 34(32–35), Sti IV 34(32–35), St IV 43(42–45). Chaetotaxy: genu II: 2–2/0,2/0–1; genu III: 1–2/0,2/0–1.

Male. Unknown.

Locality and type material. Holotype female from *Citrus* sp., Luwero, Kyankonwa, Uganda, 05-X-1990, J.S. Yaninek, deposited at ESALQ-USP. One paratype female from *Persea americana*, 14 km SW Mvieng, Cameroon, 07-II-1991, L. Louis, deposited at IITAIM.

Etymology. The epithet *brachydactylus* refers to the short fixed cheliceral digit of the types of this new species.

Remarks. The new species fits the original description of the genus. However, it is different from all known *Proprioseiopsis* species by having fixed cheliceral digit at least twice shorter.

Proprioseiopsis bregetovae (Abbasova, 1970) and *P. okanagensis* (Chant, 1957) differ from this new species by having reticulate ventrianal shield. Furthermore, *P. bregetovae* has the posterior half of dorsal shield reticulate.

***Proprioseiopsis bremaensis* Moraes, Zannou & Oliveira n. sp.**

(Fig. 8)

Diagnosis. Species characterized by having dorsal shield mostly smooth, with few anterolateral striae; seta Z5 slightly shorter than setae z4, Z4 and s4; setae z4, Z4, Z5, s4 and Jv5 serrate; z2 and z4 about as long as distances between their bases and the bases of the following setae; sternal shield with few lateral striae; ventrianal shield subtriangular, reticulate, about as long as wide at level of Zv2; fixed cheliceral digit with few teeth (apparently 3 teeth); calyx of spermatheca cup-shaped.

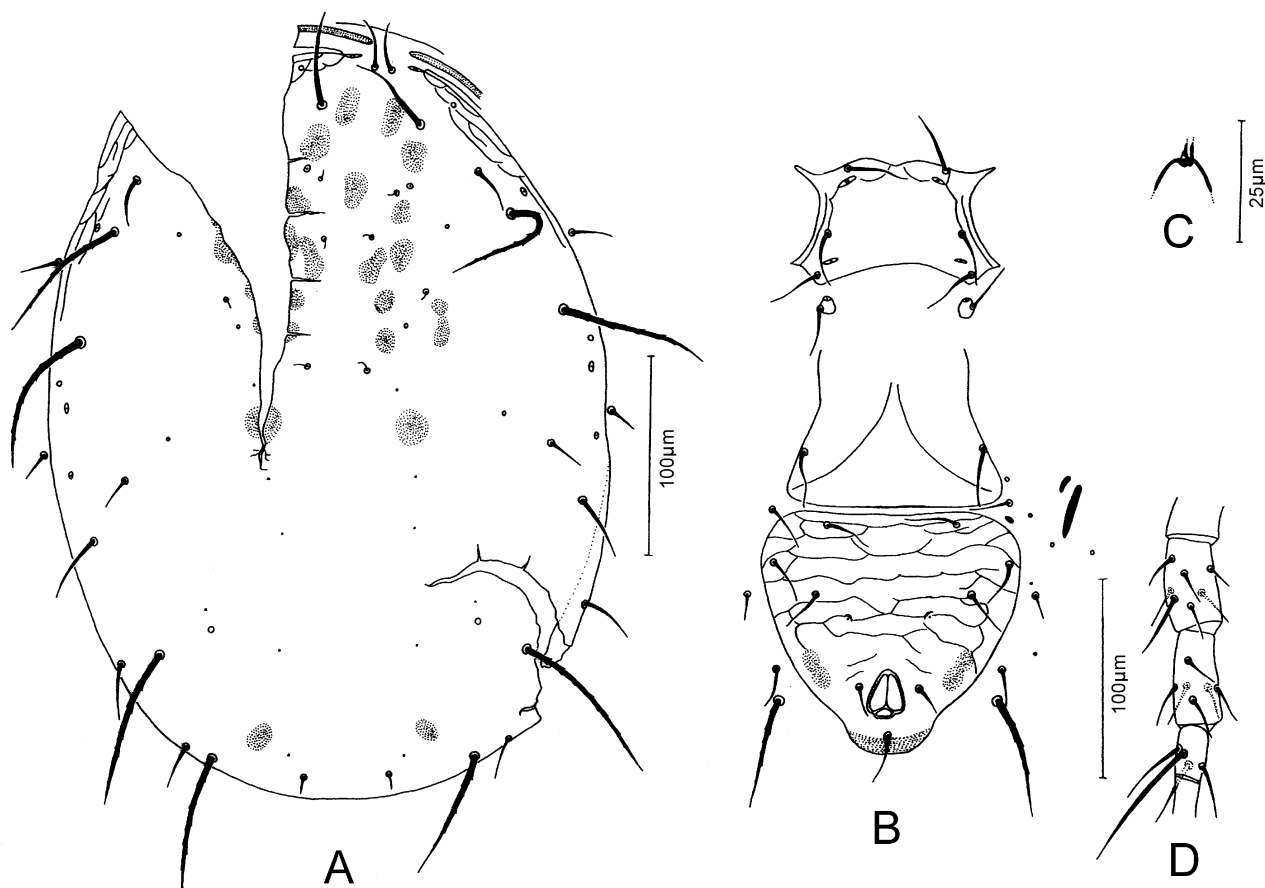


FIGURE 8. *Proprioseiopsis bremaensis* Moraes, Zannou & Oliveira n. sp. (female): A. Dorsal shield; B. Ventral sur-

face; C. Spermatheca; D. Leg IV.

Female. (1 specimen measured).

Dorsum. Dorsal shield smooth, with few anterolateral striae, 341 long and 240 wide. Setae j1 24, j3 41, j4 5, j5 5, j6 5, J5 10, z2 29, z4 70, z5 5, Z1 17, Z4 74, Z5 62, s4 74, S2 34, S4 24, S5 14, r3 17, R1 12. Setae z4, Z4, Z5 and s4 serrate, other setae smooth.

Venter. Sternal shield mostly smooth, few anterior and lateral striae; posterior margin concave; distances between St1-St3 50, St2-St2 67. Genital shield smooth; distance between St5-St5 91. Ventrianal shield subtriangular, reticulate, anterior margin very slightly concave, 118 long, 127 wide at level of Zv2, elliptical preanal pores mesad and slightly posterior to Jv2; Jv5 serrate and other ventral setae smooth.

Chelicera. Movable digit 30 long, with 1 tooth; fixed digit 27 long, apparently with 3 teeth and a *pilus dentilis*.

Spermatheca. Calyx cup-shaped 7 long, 10 in diameter at its distal extreme; atrium small.

Legs. Sharp-tipped macrosetae; Sge III 19, Sge IV 34, Sti IV 19, St IV 65. Chaetotaxy: genu II: 2-2/0,2/0-1; genu III: 1-2/1,2/0-1.

Male. Unknown.

Locality and type material. Holotype female from *Capsicum* sp., 3 km N Brema, Ghana, 05-IV-1990, B. Haruna and K. Antwi, deposited at ESALQ-USP.

Etymology. The epithet *bremaensis* refers to the location where the type of this new species was collected.

Remarks. *Proprioiseiopsis bregetovae* differs from this new species by having the posterior region of the dorsal shield reticulate and because its z4 and Jv5 are smooth. *Proprioiseiopsis okanagensis* differs from this new species by having Z5 longer than z4, Z4 and s4; in addition, it has all dorsal setae as well as Jv5 smooth, and fixed cheliceral digit multidentate. Both of those species differ from the new species by having calyx of spermatheca bell-shaped.

***Proprioiseiopsis chilosus* (Van der Merwe)**

(Fig. 9)

Amblyseius (*Amblyseius*) *chilosus* Van der Merwe, 1968: 125; Ueckermann & Loots, 1988: 66.

Proprioiseiopsis chilosus, Moraes *et al.*, 2004: 174; Chant & McMurtry, 2005a: 15.

Female. (Specimens measured. South Africa: holotype and 1 paratype)

Dorsum. Dorsal shield smooth, 328 [356] long and 230 [236] wide. Setae j1 19 [22], j3 41, j4 6, j5 6, j6 9, J5 9, z2 22, z4 22, z5 6, Z1 9, Z4 60 [63], Z5 72 [76], s4 57 [59], S2 9, S4 6, S5 8, r3 19, R1 13. Seta z4 rather closely associated with z2 and mediolateral to z2-s4. Setae smooth, except Z4 and Z5 which are serrate.

Venter. Sternal shield smooth, posterior margin concave; distances between St1-St3 54 [57], St2-St2 55 [60]. Genital shield smooth; distance between, St5-St5 67 [74]. Ventrianal shield pentagonal, reticulate, anterior margin straight, 113 long, 111 [117] wide at level of Zv2 and 95 [98] wide at level of anus, small preanal pores posteromesad to Jv2. Ventral setae smooth.

Chelicera. Movable digit 28 long, with 1 tooth; fixed digit 28 long, with 3 teeth and a *pilus dentilis*.

Spermatheca. Calyx saccular, 13 [16] long; atrium small, bifid.

Legs. Sharp-tipped macrosetae; Sge IV 44 [45], St IV 62 [63]. Chaetotaxy: Sge II: 2-2/1, 2/0-1; Sge III: 1-2/1, 2/0-1.

Specimens examined. South Africa: Potchefstroom, North-West Province, on grass, 20-X-1954, P.A.J. Ryke.

Remarks. Compared to the original description of the genus (Chant & McMurtry, 2005a), the macroseta on tibia IV of the types of this species is not much longer than the other setae on the segment.

World distribution. South Africa.

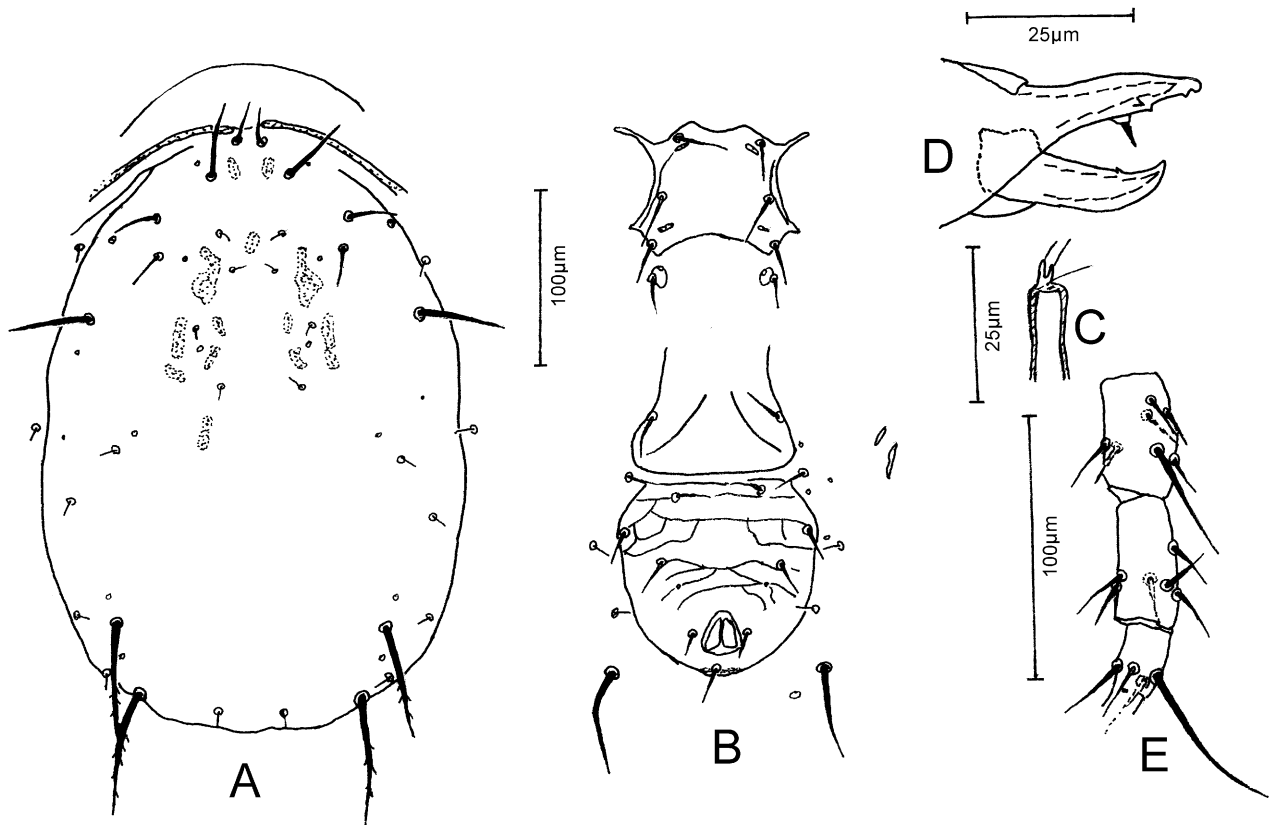


FIGURE 9. *Proprioiseiopsis chilosus* (Van der Merwe) (female): A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Chelicera; E. Leg IV.

***Proprioiseiopsis eurynotus* (Van der Merwe)**

(Fig. 10)

Amblyseius (*Amblyseius*) *eurynotus* Van der Merwe, 1968: 123; Ueckermann & Loots, 1988: 67.

Proprioiseiopsis eurynotus, Moraes *et al.*, 2004: 176; Chant & McMurtry, 2005a: 15.

Female. (Specimens measured. South Africa: holotype, 1 paratypes and 3 additional specimens)

Dorsum. Dorsal shield smooth, 333(315–343) [343] long and 246(224–261) [261] wide. Setae j1 27(25–28) [28], j3 54(41–60) [60], j4 5(4–5) [5], j5 5(4–5) [5], j6 6(5–6) [5], J5 8(6–9), z2 25, z4 16(13–19), z5 5(4–5) [5], Z1 6(5–6) [6], Z4 81(54–91) [91], Z5 76(63–88) [88], s4 77(67–82) [82], S2 6, S4 8(6–9) [8], S5 10(9–13) [9], r3 16(13–18) [18], R1 9. Setae smooth, except Z4 and Z5 which are serrate.

Venter. Sternal shield smooth, posterior margin concave; distances between St1–St3 51(50–52) [52], St2–St2 65(63–66) [60]. Genital shield smooth; distance between St5–St5 76(69–79) [69]. Ventrianal shield subtriangular, reticulate, anterior margin slightly concave, 107(101–120) [120] long, 105(95–115) [115] wide at level of Zv2 and 80(72–85) [85] wide at level of anus, small preanal pores posteromesad to Jv2. Ventral setae smooth.

Chelicera. Movable digit 28 long, with 1 tooth; fixed digit 28 long, with 4 teeth and a *pilus dentilis*.

Spermatheca. Calyx saccular, 17(16–19) long; atrium appressed to the base of the calyx.

Legs. Sharp-tipped macrosetae; Sge II 27(25–28) [25], Sge III 32(28–35) [28], Sge IV 59(57–63) [63], Sti IV 43(35–50) [50], St IV 58 (50–66) [66]. Chaetotaxy: Sge II: 2-2/1, 2/0- 1; Sge III: 1-2/1, 2/0-1.

Specimens examined. South Africa: Potchefstroom, North-West Province, holotype and paratype, on

grass and *Medicago sativa*, 20-X-1954 and April 1956, P.A.J. Ryke; Charters Creek, near Lake St. Lucia, Kwazulu/Natal Province, on grass, 24-I-1966, L.J. Erasmus; Groblersdal, Mpumalanga Province, on *Lantana rugosa*, 5-XII-1979, M.K.P. Smith Meyer; Gladdespruit, near Badplaas, Mpumalanga Province, on grass, 26-IV-1972, K.N. de Kock.

World distribution. South Africa.

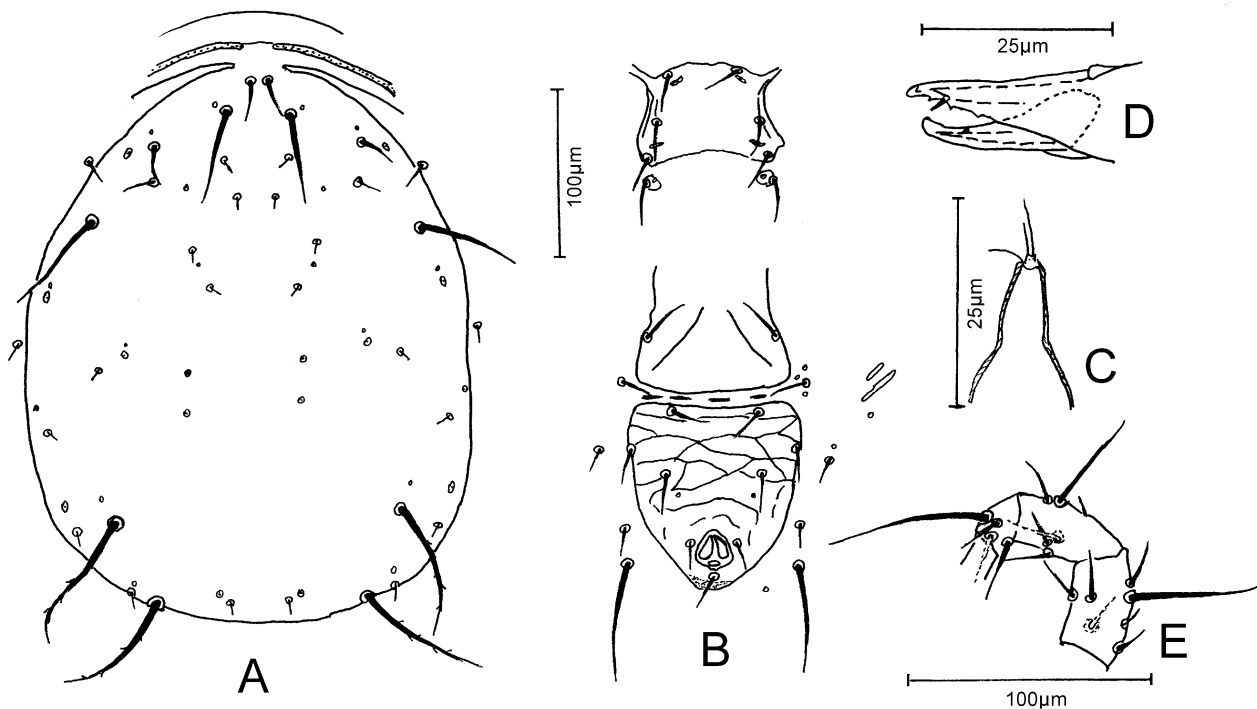


FIGURE 10. *Proprioseiopsis eurynotus* (Van der Merwe) (female): A. Dorsal shield; B. Ventral surface; C. Spermtheca; D. Chelicera; E. Leg IV.

***Proprioseiopsis messor* (Wainstein)**

(Fig. 11)

Typhlodromus messor Wainstein, 1960: 688.

Amblyseius messor, Athias-Henriot, 1961: 425.

Amblyseius (*Amblyseius*) *messor*, Ueckermann & Loots, 1988: 66.

Proprioseiopsis messor, Moraes *et al.*, 2004: 180; Chant & McMurtry, 2005a: 15.

Amblyseius (*Amblyseius*) *apheles* Van der Merwe, 1968: 121 (synonymy according to Ueckermann & Loots, 1988).

Amblyseius lindquisti Schuster & Pritchard, 1963: 246 (synonymy according to Abbasova, 1972).

Female. (Specimens measured. South Africa: 2)

Dorsum. Dorsal shield smooth, 386(384–387) long and 248(244–252) wide. Setae j1 32, j3 46(41–50), j4 4, j5 4, j6 9(8–9), J5 13, z2 35, z4 17, z5 5, Z1 7(6–8), Z4 115(107–123), Z5 169(154–183), s4 82(76–88), S2 9, S4 9, S5 18(16–19), r3 22(21–22), R1 13. Setae smooth, except Z4 and Z5 which are serrate.

Venter. Sternal shield mostly smooth, with lateral striae, posterior margin concave; distances between St1–St3 61(59–62), St2–St2 77(67–82). Genital shield smooth; distance between St5–St5 82(81–82). Ventrianal shield pentagonal, reticulate, anterior margin very slightly concave, 122(117–126) long, 112(110–113) wide at level of Zv2 and 91 wide at level of anus, small preanal pores posterior to Jv2 (see remarks below). Ventral setae smooth.

Chelicera. Movable digit 29(28–30) long, with 1 tooth; fixed digit 28(27–28) long, with 4 teeth and a *pilus dentilis*.

Spermatheca. Calyx saccular, 15(13–16) long; atrium appressed to base of the calyx.

Legs. Sharp-tipped macrosetae; Sge II 30(28–32), Sge III 40(38–41), Sge IV 79, Sti IV 63(60–66), St IV 69. Chaetotaxy: Sge II: 2-2/1, 2/0- 1; Sge III: 1-2/1, 2/0-1.

Specimens examined: South Africa: Stellenbosch, Western Cape Province, from *Populus* sp., 12-I-1955, P.A.J. Ryke.

Remarks. In both specimens, one member of preanal pores is posterior and slightly mesad to Jv2, whereas the other is well posterior and laterad to JV2, next to the margin of the ventrianal shield.

World distribution. Algeria, Armenia, Australia, Azerbaijan, France, Gaza, Georgia, Germany, Greece, Israel, Italy, Morocco, New Zealand and South Africa.

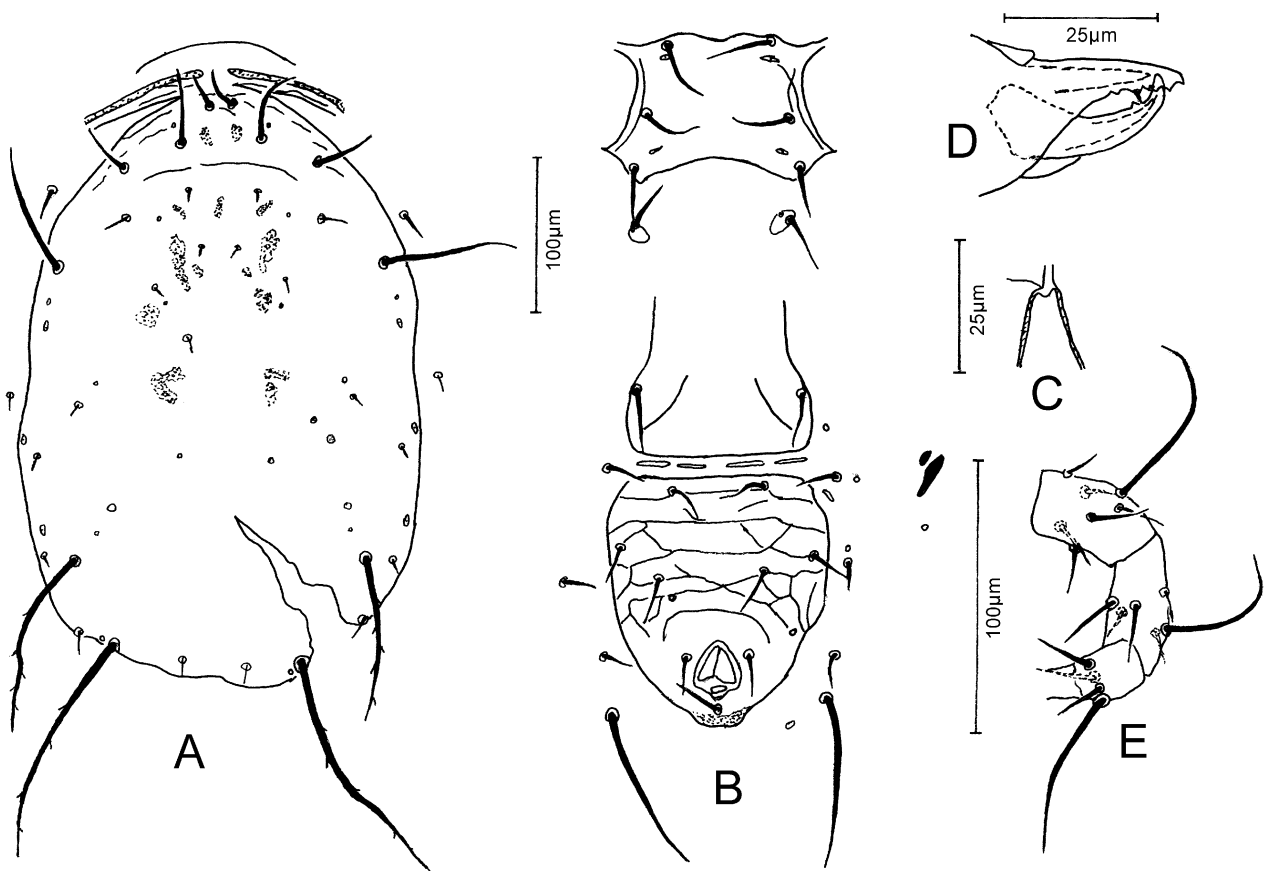


FIGURE 11. *Proprioseiopsis messor* (Wainstein) (female): A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Chelicera; E. Leg IV.

***Proprioseiopsis mexicanus* (Garman)**

(Fig. 12)

Amblyseiopsis mexicanus Garman, 1958: 75.

Amblyseiulus mexicanus, Muma, 1961: 278.

Proprioseiopsis mexicanus, Moraes *et al.*, 2004: 181; Chant & McMurtry, 2005a: 13.

Proprioseiopsis (Patinoseius) mexicanus, Karg, 1989: 209.

Typhlodromus mexicanus, Hirschmann, 1962: 5.

Typhlodromus (Amblyseius) mexicanus, Chant, 1959: 92.

Female. (Specimens measured. Ghana: 1; Kenya: 2; Mexico: holotype)

Dorsum. Dorsal shield mostly smooth, with some rare lateral striae, 340(336-344) [355] long and 223(214-230) [216] wide. Setae j1 17(16-18) [22], j3 28(26-29) [28], j4 5(5-6) [6], j5 4(3-5) [5], j6 6(5-6) [7], J5 9(8-10) [7], z2 12(8-16) [14], z4 9(8-11) [10], z5 4(3-5) [5], Z1 8 [6], Z4 69(62-74) [73], Z5 102(94-112) [98], s4 54(53-56) [56], S2 9(8-10) [8], S4 9(8-10) [8], S5 10(10-11) [8], r3 15(14-16) [13], R1 8(6-10) [7]. Setae smooth, except Z4 and Z5 which are serrate.

Venter. Sternal shield reticulate, posterior margin very slightly concave; distances between St1-St3 60(59-61), St2-St2 64. Genital shield smooth; distance between St5-St5 65(61-69). Ventrianal shield pentagonal, reticulate, anterior margin straight, 113(109-115) [112] long, 97(91-101) [96] wide at level of Zv2 and 77(72-80) wide at level of anus, preanal pores mesad and slightly posterior to Jv2. Ventral setae smooth.

Chelicera. Movable digit 34(33-34) long, with 1 tooth; fixed digit 29(28-29) long, with 8 teeth and a *pilus dentilis*.

Spermatheca. Calyx shallow cup-shaped, 3(3-4) long, 9(9-10) in diameter; atrium appressed to the base of the calyx.

Legs. Sharp-tipped macrosetae; Sge II 23(22-24) [25], Sge III 23(22-24) [25], Sge IV 49(45-51) [54], Sti IV 27 [32], St IV 58 [62]. Chaetotaxy: genu II: 2-2/0,2/0-1; genu III: 1-2/1,2/0-1.

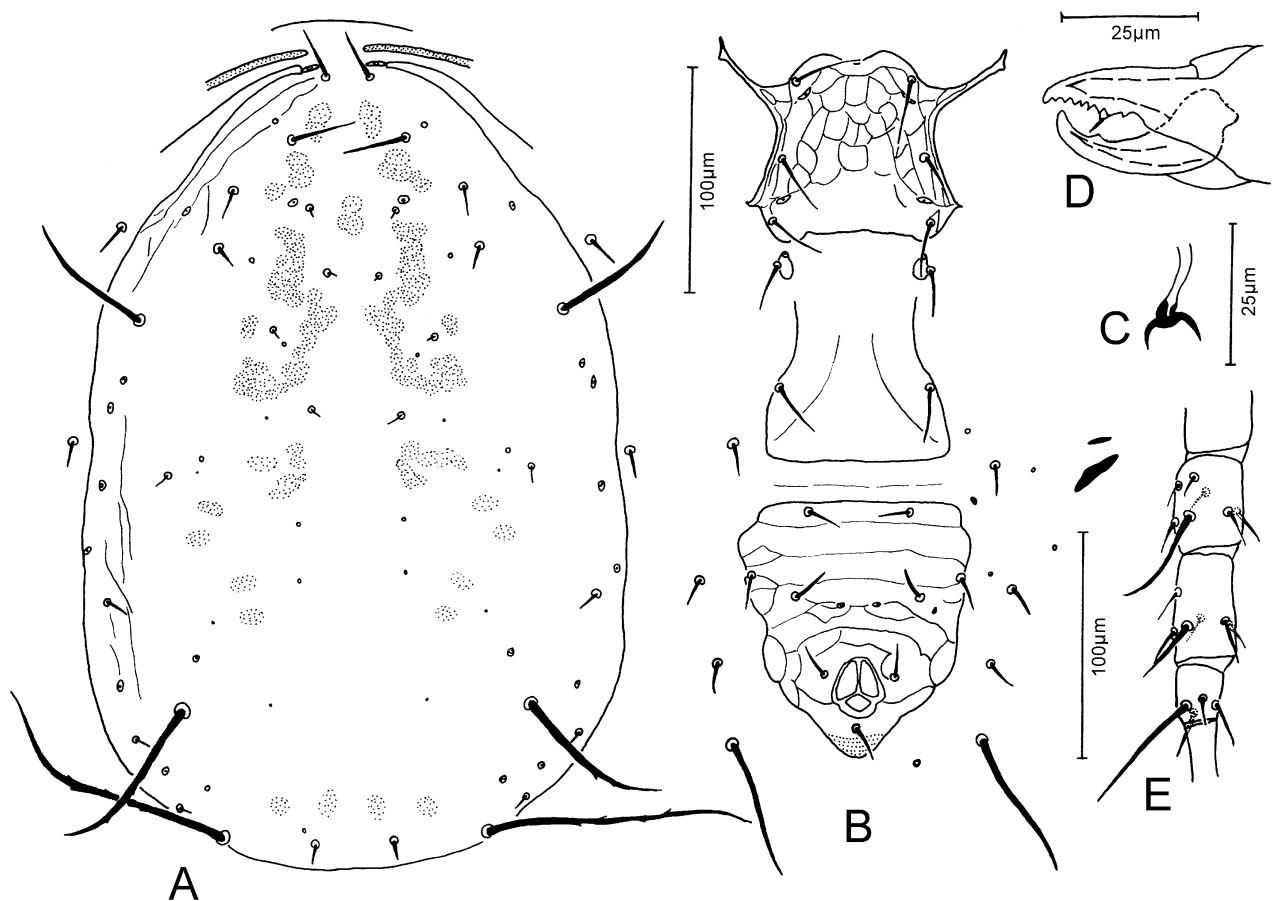


FIGURE 12. *Proprioiseiopsis mexicanus* (Garman) (female): A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Chelicera; E. Leg IV.

Specimens examined. Ghana: Atimpoku, Adomi Bridge, Eastern Region, on *Centrosema pubescens*, 13-XI-1989, G.J. de Moraes. Kenya: 6 km N Mtwapa, Coastal Province, on *Synedrella nodiflora*, 30-XI-1989, J.S. Yaninek; 3 km E Kisi, on unknown plant, 3-XII-1989; J.S. Yaninek. Mexico: Holotype female intercepted

at Brownsville, Texas, USA, on *Zinnia* sp. 27-VI-1937, G. F. Callaghan.

Remarks. This is the first record of this species in Africa.

World distribution. Australia, Brazil, Colombia, Cuba, Ghana, Guadeloupe, Hawaii, Kenya, Mexico, New Zealand, Panama, USA.

***Proprioseiopsis ovatus* (Garman)**

(Fig. 13)

Amblyseiopsis ovatus Garman, 1958: 78.

Amblyseiulus ovatus, Muma, 1961: 278.

Proprioseiopsis ovatus, Moraes *et al.*, 2004: 184; Chant & McMurtry, 2005a: 15.

Proprioseiopsis (*Proprioseiopsis*) *ovatus*, Karg, 1989: 208.

Typhlodromus ovatus, Hirschmann, 1962: 19.

Typhlodromus (*Amblyseius*) *ovatus*, Chant, 1959: 90.

Amblyseius (*Amblyseius*) *peltatus* Van der Merwe, 1968: 119 (synonymy according to Tseng, 1983).

Amblyseius parapeltatus Wu & Chou, 1981: 274 (synonymy according to Tseng, 1983)

Female. (Specimens measured. Ghana: 4; Kenya: 2; Sierra-Leone: 1; Zimbabwe: 1; South Africa: holotype and 1 paratype of *P. peltatus*)

Dorsum. Dorsal shield smooth, 348(324–381) long and 270(227–290) wide. Setae j1 29(28–32), j3 64(57–69), j4 6(4–8), j5 6(5–8), j6 9 (8–10), J5 8(6–10), z2 39(32–44), z4 25(19–34), z5 6(5–8), Z1 21(14–24), Z4 108(88–120), Z5 88 (67–107), s4 99(91–106), S2 20(14–26), S4 14(9–16), S5 10(9–11), r3 19(16–21), R1 10(9–11). Setae smooth, except Z4 and Z5 which are serrate.

Venter. Sternal shield reticulate along lateral margins, posterior margin concave; distances between St1–St3 53(50–56), St2–St2 70(63–77). Genital shield mostly smooth, with lateral striae; distance between St5–St5 89(82–96). Ventrianal shield pentagonal, reticulate, anterior margin straight, 109(98–122) long, 108(104–115) wide at level of Zv2 and 90(84–104) wide at level of anus, preanal pores mesad and slightly posterior to Jv2. Ventral setae smooth.

Chelicera. Movable digit 33(32–34) long, with 1 tooth; fixed digit 30(28–32) long, with 5 teeth and a *pilus dentilis*.

Spermatheca. Calyx saccular, 16(13–19) long; atrium small, nodular.

Legs. Sharp-tipped macrosetae; Sge III 28(25–32), Sge IV 58(46–66), Sti IV 41(34–47), St IV 84(77–91). Chaetotaxy: Sge II: 2-2/0, 2/0- 1; Sge III: 1–2/1, 2/0–1.

Specimens examined. Ghana: 10 km E Obuasi, Ashanti Region, on unknown plant, 10-XI-1989, J.S. Yaninek; 1 km W River Pora, Beposo, Central Region, on unknown plant, 12-XI-1989, J.S. Yaninek; Atimpoku, Adomi Bridge, Eastern Region, on unknown plant, 13-XI-1989, G.J. de Moraes; 23 km N Otumi, *Chromolaena odorata*, 28-III-1990, J. Gyemenah. Kenya: 27.9 km S Mombasa, Coastal Province on *Zea mays*, 28-XI-1989; J.S. Yaninek; 17 km N Lunga Lunga, Coastal Province on *Physalis angula*, 28-XI-1989, J.S. Yaninek. Mozambique: 5.5 km SE Mitali, Zambezia Province, on *Tridax procumbens*, 25-IV-01, B. Agboton. Sierra-Leone: Njala University, on *Lantana camara*, 12-XII-1991, J.S. Yaninek. USA: Holotype female from Winter Haven, Florida, on *Canna* sp.. South Africa: Tzaneen, Limpopo Province, from *Vernonia stipulacea*, 19-II-1965, M.K.P. Smith Meyer (holotype and paratype of *P. peltatus*); Machadodorp, Mpumalanga Province, from *Pennisetum clandestinum*, 17-I-1977, E.A. Ueckermann; Zimbabwe: Triangle, from *Cynodon dactylon*, 03-XI-1969, M.K.P. Smith Meyer.

Remarks. *Proprioseiopsis peltatus* was synonymized with *P. ovatus* by Tseng (1983). The measurements of specimens from South Africa and other sub-Saharan African countries examined in this study are intermediate to those given by Moraes & McMurtry (1983) for the holotypes of *Proprioseiopsis cannaensis* (Muma, 1962) and *P. ovatus*. The spermathecae of the specimens considered in this study also seem intermediate to

those shown by Moraes & McMurtry (1983) for the holotypes of those species. It seems that *P. ovatus* could also be a senior synonym of *P. cannaensis* as admitted by Muma & Denmark (1969).

World distribution. Brazil, Costa Rica, Cuba, Ecuador, Egypt, Ghana, Hawaii, Honduras, Kenya, Philippines, Puerto Rico, Sierra Leone, South Africa, Taiwan, USA and Zimbabwe.

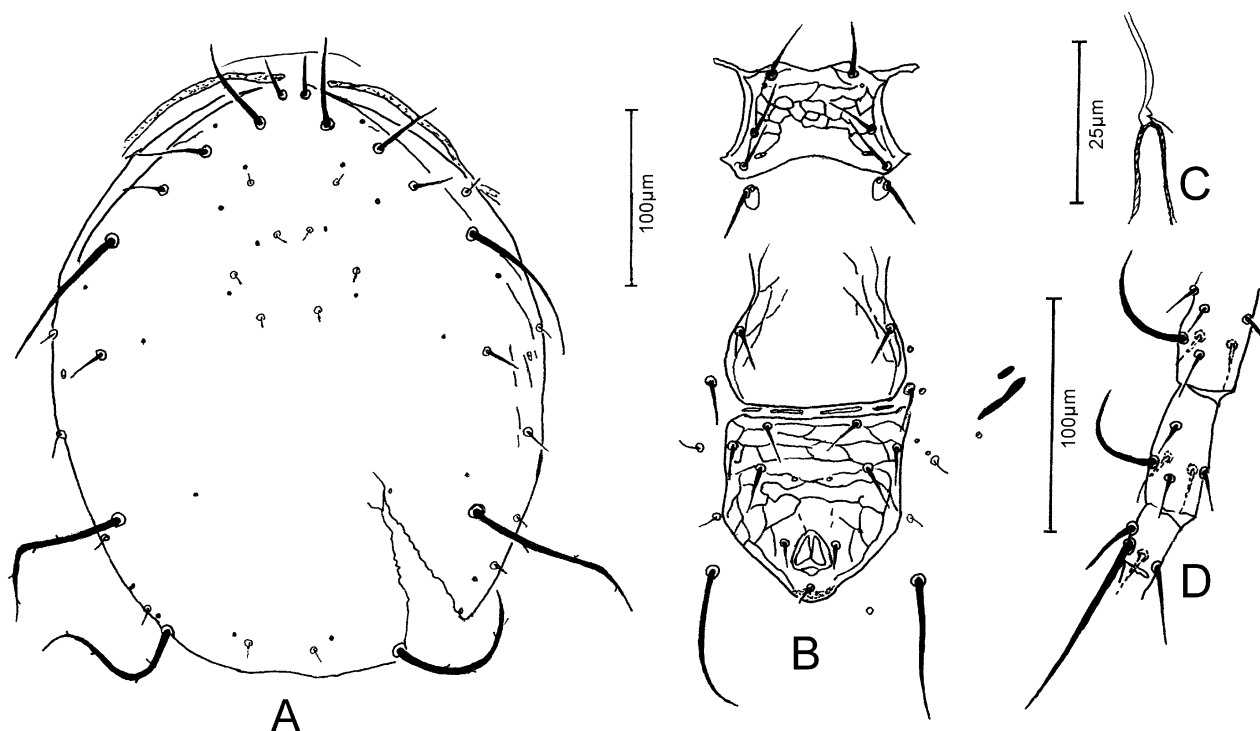


FIGURE 13. *Proprioiseiopsis ovatus* (Garman) (female): A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Leg IV.

***Proprioiseiopsis pascuus* (Van der Merwe)**

(Fig. 14)

Amblyseius (*Amblyseius*) *pascuus* Van der Merwe, 1968: 116; Ueckermann & Loots, 1988: 67.

Proprioiseiopsis pascuus, Moraes *et al.*, 2004: 186; Chant & McMurtry, 2005a: 15.

Female. (Specimens measured. South Africa: holotype and 1 additional specimen)

Dorsum. Dorsal shield smooth, 293 [318] long and 208 [235] wide. Setae j1 25, j3 35 [38], j4 5 [6], j5 5 [6], j6 6, J5 8, z2 16 [19], z4 9 [13], z5 5 [6], Z1 6, Z4 79 [91], Z5 72 [85], s4 63 [72], S2 9, S4 9, S5 9, r3 19 [22], R1 13 [16]. Setae smooth, except Z4 and Z5 which are serrate.

Venter. Sternal shield smooth, posterior margin concave; distances between St1-St3 54 [57], St2-St2 63 [65]. Genital shield smooth; distance between St5-St5 63 [66]. Ventrianal shield pentagonal, with transverse striation, anterior margin slightly concave, 101 [113] long, 95 [101] wide at level of Zv2 and 82 [85] wide at level of anus, preanal pores mesad and slightly posterior to Jv2. Ventral setae smooth.

Chelicera. Movable digit 28 long, with 2 teeth; fixed digit 28 long, with 8 teeth and a *pilus dentilis*.

Spermatheca. Calyx trumpet-shaped, 25 long; atrium nodular.

Legs. Sharp-tipped macrosetae; Sge IV 57, Sti IV 38 [41], St IV 57. Chaetotaxy: Sge II: 2-2/0, 2/0- 1; Sge III: 1-2/1, 2/0-1.

MALE. (Specimen measured. South Africa: 1 paratype).

Dorsum. Dorsal shield pattern as in female, 252 long and 161 wide. Setae j1 19, j3 25, j4 6, j5 6, j6 6, J5 6, z2 13, z4 9, z5 5, Z1 6, Z4 51, Z5 50, s4 44, S2 6, S4 6, S5 6, r3 16, R1 13. Setae smooth except Z4 and Z5 which are serrate.

Venter. Ventrianal shield subtriangular and faintly reticulate; 104 long and 139 wide at anterior corners, with 3 pairs of preanal setae, 1 pair of preanal pores, additional pores not visible.

Spermatodactyl. Shaft 14 long.

Legs. Macrosetae sharp-tipped; Sge IV 32, Sti IV 22, St IV 44. Chaetotaxy of genua II and III as in female.

Specimens examined. South Africa: Potchefstroom, North-West Province, from soil covered with *Eragrostis curvula*, 1963, L.J. Erasmus (holotype female and paratype male); Buffelspoort near Brits, North-West Province, from *Hyparrhenia hirta*, 15-III-1977, E.A. Ueckermann.

World distribution. South Africa.

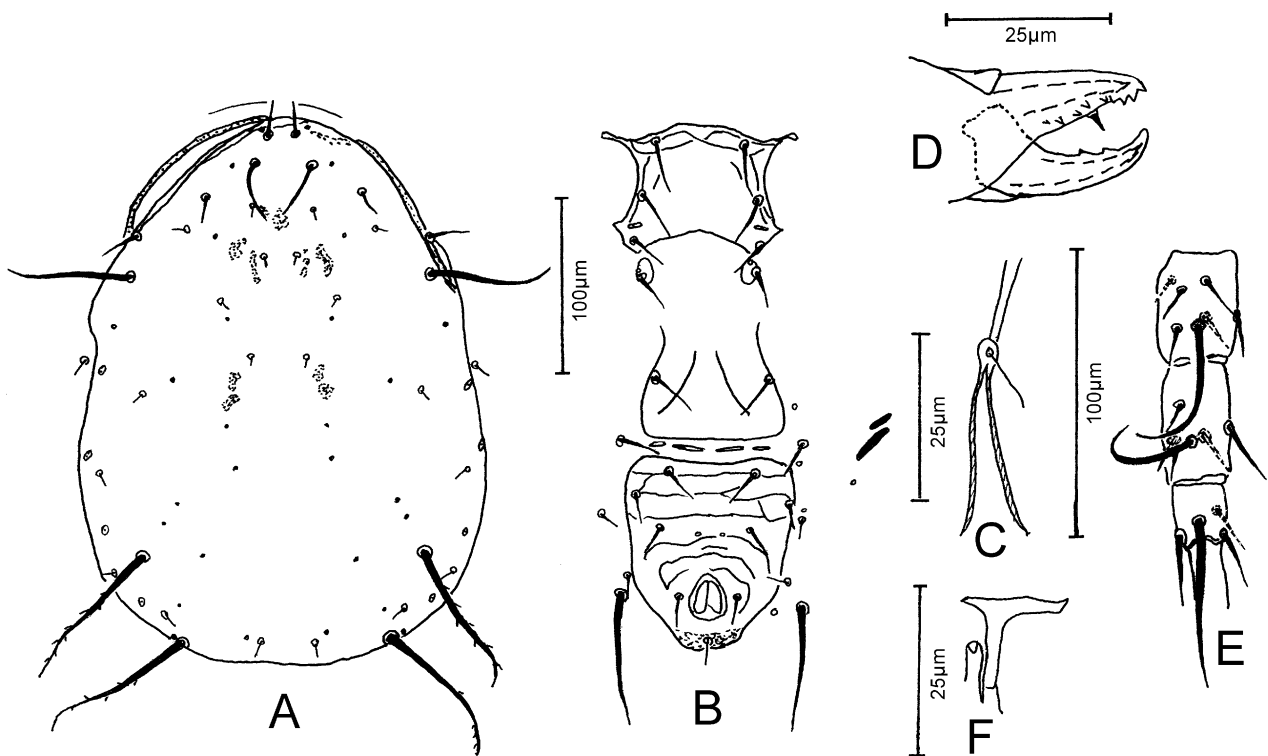


FIGURE 14. *Proprioseiopsis pascuus* (Van der Merwe): A. Female dorsal shield; B. Female ventral surface; C. Spermatheca; D. Female Chelicera; E. Female leg IV; F. Spermatodactyl.

Key to the species of *Proprioseiopsis* treated in this paper

- 1 Seta S4 absent *P. atrichos* n. sp.
- Seta S4 present..... 2
- 2 Calyx of spermatheca disc or cup-shaped, at most as long as its diameter 3
- Calyx of spermatheca not disc or cup-shaped, at least 1.6 times as long as its diameter 5
- 3 Setae z2 and z4 shorter than the distance between their bases and bases of setae next behind; sternal shield reticulate *P. mexicanus* (Garman)
- Setae z2 and z4 at least as long as the distance between their bases and bases of setae next behind; sternal shield smooth, at most with some rare lateral striae 4

- 4 Setae z4, Z4, Z5, s4 and Jv5 serrate; ventrianal shield subtriangular, reticulate, about as long as wide at level of Zv2 *P. bremaensis* n. sp.
 - Setae z4, Z4, Z5, s4 and Jv5 smooth; ventrianal shield smooth, pentagonal, distinctly longer than wide ...
 *P. brachydactylus* n. sp.
 5 Calyx of spermatheca trumpet-shaped, with the base distinctly narrower than diameter of atrium.....
 *P. pascuus* (Van der Merwe)
 - Calyx of spermatheca saccular, with the base distinctly wider than diameter of atrium..... 6
 6 Central region of sternal shield reticulate; lateral region of genital shield striate *P. ovatus* (Garman)
 - Central region of sternal shield and whole genital shield smooth 7
 7 Setae Z5 longer than distance between their bases *P. messor* (Wainstein)
 - Setae Z5 shorter than distance between their bases..... 8
 8 Seta z2 as long as z4; s4 at most as long as distance between its base and the base of z4.....
 *P. chilosus* (Van der Merwe)
 - Seta z2 ca. 1.6 times as long as z4; s4 ca. 1.5 times as long as distance between its base and the base of z4
 *P. eurynotus* (Van der Merwe)

Tribe Typhlodromipsini Chant & McMurtry

Typhlodromipsini Chant & McMurtry, 2005b: 318.

Chant & McMurtry (2005b) gave a full description of this Amblyseiinae tribe. Diagnostic characters for this tribe (Chant & McMurtry, 2006) are: idiosoma with more than 25 pairs of setae, ratio between the length of seta s4 and that of seta Z1 smaller than 3.1, seta S4 present, dorsal shield entire, peritrematal shield fused anteriorly to the dorsal shield, peritreme extending forward to level of j1, sternal shield with 3 pairs of setae and usually without median posterior projection, females with 3 pairs of preanal setae and a pair of preanal pores, fixed cheliceral digit multidentate, and genera II and III rarely without macrosetae.

Of the 8 genera belonging to this subtribe (Chant & McMurtry, 2005b), only *Afrodromips* Chant & McMurtry, *Aristadromips* Chant & McMurtry, *Scapulaseius* Karg & Oomen-Kalsbeek and *Typhlodromips* De Leon are known from sub-Saharan Africa.

Afrodromips Chant & McMurtry

Afrodromips Chant & McMurtry, 2005b: 330.

The single species known in this genus (Chant & McMurtry, 2005b) was described from Africa. Distinguishing characteristics of this genus are: sum of the ratios “length of dorsal shield/ length of S4” and “length of dorsal shield/ length of S5” greater than 26.0; idiosomal setal pattern 10A:10B/JV-3:ZV (seta J1 present); r3 and R1 inserted on dorsal shield; absence of seta z6; seta s4 at least twice as long as one or more of the other lateral setae; setae z2 and z4 not longer than distances between their bases and bases of next setae behind.

Afrodromips tanzaniensis (Yoshida-Shaul & Chant)

Amblyseius tanzaniensis Yoshida-Shaul & Chant, 1988: 2053.

Remarks. This species was described from specimens collected in Sanya, Tanzania, where it was associated

with the ant *Crematogaster nigriceps*, on an unknown plant. No additional specimens were collected in this study.

World distribution. Tanzania.

***Aristadromips* Chant & McMurtry**

Aristadromips Chant & McMurtry 2005b: 319.

Stable characters mentioned by Chant & McMurtry (2005b) for species of this genus are: sum of the ratios “length of dorsal shield/ length of S4” and “length of dorsal shield/ length of S5” smaller than 25.0; idiosomal setal pattern 10A:9B/JV-3:ZV; setae J1 and z6 absent; setae z2 and z4 longer than distances between their bases and the bases of setae next behind; R1 inserted on lateral membrane, genua II and III with macrosetae. Males with 3, 4 or 6 pairs of preanal setae.

Two species of this genus were found in sub-Saharan Africa.

***Aristadromips aberdaresensis* Moraes, Zannou & Oliveira, n. sp.**

(Fig. 15)

Diagnosis. This new species is distinct by having dorsal shield mostly smooth, with lateral striae between j1 and S2; z2 and z4 approximately as long as distances between their bases and the bases of the setae next behind; ventrianal shield of the female constricted at level of Jv2, with transverse striae anteriorly to preanal pores and with reticulation between preanal pores and anterior margin of anus; male with 6 pairs of preanal setae.

Female. (5 specimens measured).

Dorsum. Dorsal shield mostly smooth, with lateral striae in region anterior to S2, 352(344–362) long and 206(200–211) wide. Setae j1 26(24–29), j3 39(35–40), j4 21(19–24), j5 15(14–16), j6 18(16–19), J2 19(18–19), J5 10(10–11), z2 29(27–30), z4 36(30–37), z5 12(11–13), Z1 28(27–30), Z4 55(53–58) Z5 76(74–80), s4 51(50–53), S2 47(45–50), S4 28(26–30), S5 27(24–30), r3 35(32–37), R1 22(21–24). Setae smooth, except Z4 and Z5 which are lightly serrate; r3 and R1 inserted on interscutal membrane.

Venter. Sternal shield smooth, posterior margin straight; distances between St1–St3 66(62–67), St2–St2 63(62–64). Genital shield smooth; distance between St5–St5 64(61–69). Ventrianal shield pentagonal, constricted laterally at level of Jv2, with transverse striae anteriorly to preanal pores and with reticulation between preanal pores and anterior margin of anus; anterior margin about straight, 120(117–125) long, 82(80–85) wide at level of Zv2 and 78(75–80) wide at level of anus, elliptical preanal pores posteromesad to Jv2. Two pairs of metapodal shields. Ventral setae smooth.

Chelicera. Movable digit 33(33–34) long, apparently with 3 teeth; fixed digit 29(28–29) long, apparently with 12 teeth and a *pilus dentilis*.

Spermatheca. Calyx bell-shaped, 18(16–24) long; atrium appressed to the base of the calyx.

Legs. Sharp-tipped macrosetae; Sge II 25(22–29), Sge III 22(19–24), Sti III 20(18–21), Sge IV 41(40–43), Sti IV 31(27–34), St IV 66(64–72). Chaetotaxy: genu II: 2-2/0,2/0-1; genu III: 1–2/1,2/0–1.

Male. (1 specimen measured).

Dorsum. Dorsal shield pattern as in female, 275 long and 197 wide. Setae j1 21, j3 32, j4 21, j5 16, j6 18, J2 16, J5 10, z2 19, z4 29, z5 14, Z1 19, Z4 40, Z5 51, s4 42, S2 38, S4 24, S5 22, r3 26, R1 24. Setae smooth, except Z4 and Z5 which are lightly serrate.

Venter. Ventrianal shield subtriangular, reticulate; 118 long, 147 wide at the anterior corners; with 6 pairs

of preanal setae, 4 pairs of lyrifissures (anteromesad to Zv1, posterolateral to Zv1, anterolateral to Zv3 and between Zv2 and Zv3), elliptical preanal pores in line with Jv2.

Spermatodactyl. Shaft distally bifurcate, 30 long.

Legs. Sharp-tipped macrosetae; Sge II 18, Sge III 18, Sti III 16, Sge IV 27, Sti IV 24 and St IV 51. Chaetotaxy of genua II and III as in female.

Locality and type material. Holotype female, 7 paratype females and 1 allotype male from *Erynglossum* sp., Aberdares, Kenya, 26-XII-1989, H. Van der Berg, deposited at ESALQ-USP.

Etymology. The epithet *aberdarensis* refers to the location where the types of this species were collected.

Remarks. This species fits the description of *Aristadromips* except for the larger value of the sum of the ratios “length of dorsal shield/ length of S4” and “length of dorsal shield/ length of S5” (ca. 25.6) and for having z2 and z4 approximately as long as the distances between their bases and the bases of the following setae. Such characteristics are intermediate between those of *Aristadromips* and *Typhlodromips* De Leon. Within the latter genus, the shape of the spermatheca would place this species closer to those of the *ariri* species group of Chant & McMurtry (2005b). The number of male preanal setae, however, indicates that it should be placed in the genus *Aristadromips*.

Aristadromips masseei (Nesbitt, 1951) differs from this new species by having the calyx of spermatheca distinctly wider and shorter, and by having preanal pores of both sexes smaller and distinctly further apart. Three species of the *ariri* species group of *Typhlodromips* resemble this new species: *T. alpicola* (Ehara, 1982), *T. hamiltoni* (Chant & Yoshida-Shaul, 1978) and *T. tee* (Schicha, 1983). However, for each of them the sum of the ratios “length of dorsal shield/ length of S4” and “length of dorsal shield/ length of S5” is considerably larger than 26.0. In addition, dorsal shield is reticulate in *T. alpicola* and smooth in *T. hamiltoni*, and both have shorter dorsocentral setae than this new species. The calyx of the spermatheca is cup-shaped in *T. hamiltoni*, whereas ventrianal shield is smooth in *T. tee*. The males of *T. alpicola* and of *T. tee* have only 3 pairs of preanal setae (the male of *T. hamiltoni* has not been described).

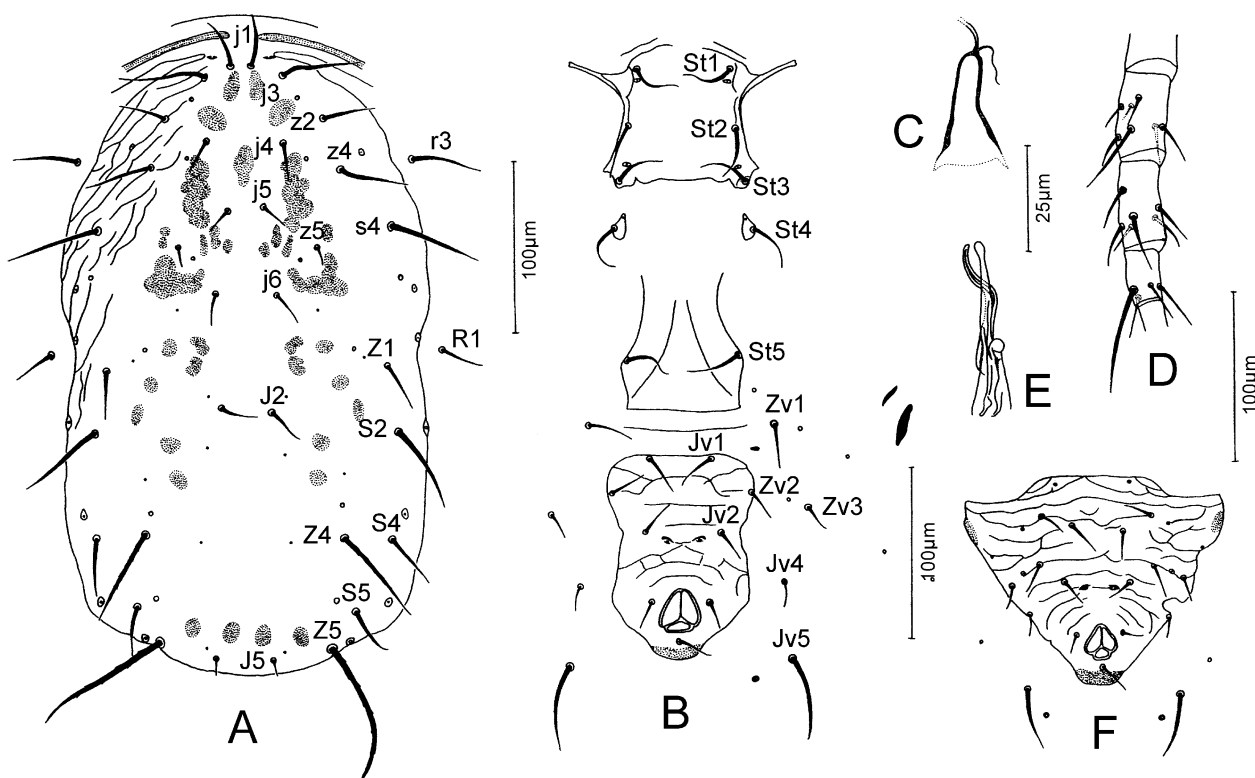


FIGURE 15. *Aristadromips aberdarensis* Moraes, Zannou & Oliveira, n. sp.: A. Female dorsal shield; B. Female ventral surface; C. Spermatheca; D. Female leg IV; E. Spermatodactyl; F. Male ventrianal shield.

***Aristadromips cydonus* (Ueckermann & Loots)**

Amblyseius (*Amblyseius*) *cydonus* Ueckermann & Loots, 1988: 135.

Amblyseius cydonus Moraes *et al.* 2004: 22.

Remarks. This species was described from specimens collected in Golden Gate Highland National Park, Orange Free State, South Africa, on *Cydonia oblonga*. No additional specimens were collected in the present study.

Chant and McMurtry did not list this species in any genus in their revision of the subfamily Amblyseiinae. However, it fits the description of *Aristadromips* (tribe Typhlodromipsini).

World distribution. South Africa.

***Scapulaseius* Karg & Oomen-Kalsbeek**

Amblyseius (*Scapulaseius*) Karg & Oomen-Kalsbeek, 1987: 132.

newsami group of *Typhlodromus* (*Amblyseius*), Chant, 1959: 95.

markwelli species group of *Amblyseius*, Schicha, 1987: 25.

japonicus species group of *Amblyseius*, Schicha, 1987: 26.

oguroi species group of *Amblyseius*, Wu & Ou, 1999: 103.

Scapulaseius, Chant & McMurtry, 2005b: 331.

Stable characters mentioned by Chant & McMurtry (2005b) for species in this genus are: dorsal shield usually without a constriction at level of R1; idiosomal setal pattern 10A:9B/JV-3:ZV; sum of the ratios "length of dorsal shield/ length of S4" and "length of dorsal shield/ length of S5" larger than 26.0; dorsal setae (except Z5 and sometimes Z4) short to minute and subequal; setae J1 and z6 absent; setae z2 and z4 not longer than distances to bases of setae next behind; setae r3 and/or R1 of adult female inserted on dorsal shield; peritreme extending forward to level of j1; with 3 pairs of sternal setae; 3 pairs of preanal setae, a pair of preanal pores; genua II and III with macrosetae. Males usually with 3 or 4 pairs of preanal setae.

A single species of this genus was reported from sub-Saharan Africa.

***Scapulaseius asiaticus* (Evans)**

Typhlodromus asiaticus Evans, 1953: 461.

Typhlodromus (*Amblyseius*) *asiaticus*, Chant, 1959: 80.

Amblyseius (*Typhlodromopsis*) *asiaticus*, Muma, 1961: 287.

Scapulaseius asiaticus, Chant & McMurtry, 2005b: 335.

Amblyseius linearis Corpuz-Raros & Rimando, 1966: 125 (synonymy according to Schicha & Corpuz-Raros, 1992).

Amblyseius (*Amblyseius*) *siaki* Ehara & Lee, 1971: 64 (synonymy according to Ehara & Bhandhufalck, 1977).

Remarks. This species was described from specimens collected in Bogor, Java, Indonesia, from an unspecified substrate. It was also collected in Angola (Carmona 1968). No additional specimens were collected in this study.

World distribution. Angola, China, Hong-Kong, India, Indonesia, Malaysia, Philippines, Singapore, Thailand.

***Typhlodromips* De Leon**

Typhlodromips De Leon, 1965: 23; Moraes *et al.*, 2004: 205(in part); Chant & McMurtry, 2005b: 323.

Amblyseius (*Typhlodromips*), Wainstein, 1983: 313.

Stable characters mentioned by Chant & McMurtry (2005b) for species of this genus are: sum of the ratios “length of dorsal shield/ length of S4” and “length of dorsal shield/ length of S5” larger than 26.0; dorsal shield with a constriction at level of R1; idiosomal setal pattern 10A:9B/JV-3:ZV (except *Typhlodromips extrasetus* Moraes, Oliveira & Zannou, 2001a, with setal pattern 10A:10B/JV-3:ZV; in this case, seta J1 present); dorsal setae (except Z5 and sometimes Z4) short or of medium length and subequal; seta z6 absent; setae z2 and z4 not longer than distances to bases of setae next behind; setae r3 and R1 of adult female never inserted on dorsal shield; peritreme extending forward to level of j1; with 3 pairs of sternal setae; 3 pairs of preanal setae, a pair of preanal pores; genua II and III with macrosetae. Males with 3 or 4 pairs of preanal setae.

Eight species of this genus were found in sub-Saharan Africa.

***Typhlodromips culmulus* (Van der Merwe)**

(Fig. 16)

Amblyseius (*Amblyseius*) *culmulus* Van der Merwe, 1968: 132; Ueckermann & Loots, 1988: 157.

Typhlodromips culmulus, Moraes *et al.*, 2004: 210; Chant & McMurtry, 2005b: 327.

Female. (Specimens measured. South Africa: holotype and 1 paratype)

Dorsum. Dorsal shield mostly reticulate, but smooth in the central region anterior to J2 and in the region posterior to the pores immediately anterior and mesad to Z4, 334 long and 208 wide. Setae j1 19, j3 22, j4 9, j5 9, j6 13, J2 16, J5 9, z2 13, z4 13 [14], z5 9, Z1 13 [15], Z4 38 [39], Z5 69 [74], s4 30 [32], S2 13, S4 9, S5 9, r3 16, R1 13.

Venter. Sternal shield smooth, posterior margin almost straight; distances between St1-St3 47, St2-St2 52 [54]. Genital shield smooth; distance between St5-St5 60 [62]. Ventrianal shield pentagonal, smooth, anterior margin straight, 110[110] long, 82 [85] wide at level of Zv2 and 79 [82] wide at level of anus, preanal pores mesad and slightly posterior to Jv2. Two pairs of metapodal shields. Ventral setae smooth.

Chelicera. Movable digit 25 [26] long, with 3 teeth; fixed digit 22 [25] long, with 11–12 teeth and a *pilus dentilis*.

Spermatheca. Calyx dish-shaped, 2 [3], with a tubular section adjacent to the atrium; the latter kidney-shaped.

Legs. Sharp-tipped macrosetae; Sge I 30 [32], Sge II 25 [28], Sge III 28, Sti III 22 [26], Sge IV 49 [47], Sti IV 41, and St IV 63. Chaetotaxy: Sge II: 2-2/0, 2/0- 1; Sge III: 1-2/1, 2/0-1.

Male. (Specimen measured. South Africa: 1).

Dorsum. Dorsal shield pattern as in female, 268 long and 183 wide. Setae j1 19, j3 25, j4 9, j5 9, j6 9, J2 13, J5 9, z2 13, z4 13, z5 9, Z1 9, Z4 38, Z5 54, s4 25, S2 9, S4 9, S5 9, r3 16, R1 11. Setae smooth, except Z4 and Z5 which are serrate.

Venter. Ventrianal shield subtriangular and faintly reticulate; 113 long and 151 wide at anterior corners; with 3 pairs of preanal setae, preanal pores mesad and slightly posterior to Jv2, additional pores not visible.

Spermatodactyl. Shaft 19 long.

Legs. Sharp-tipped macrosetae; Sge I 24, Sge II 22, Sge III 22, Sti III 25, Sge IV 35, Sti IV 32, and St IV 54. Chaetotaxy of genua II and III as in female.

Specimens examined. South Africa: Munster, Kwazulu/Natal Province, from an unidentified plant, 15-IV-1955, P.A.J. Ryke (holotype and paratype); Agricultural Research Station, East London, Eastern Cape Province, from *Achyranthes sicula*, 2-XII-1977, M.K.P. Smith Meyer.

Remarks. This species seems very similar, if not identical to *Typhlodromips mangleae* De Leon, 1967, a species reported from the Caribbean area and South America.

World distribution. South Africa.

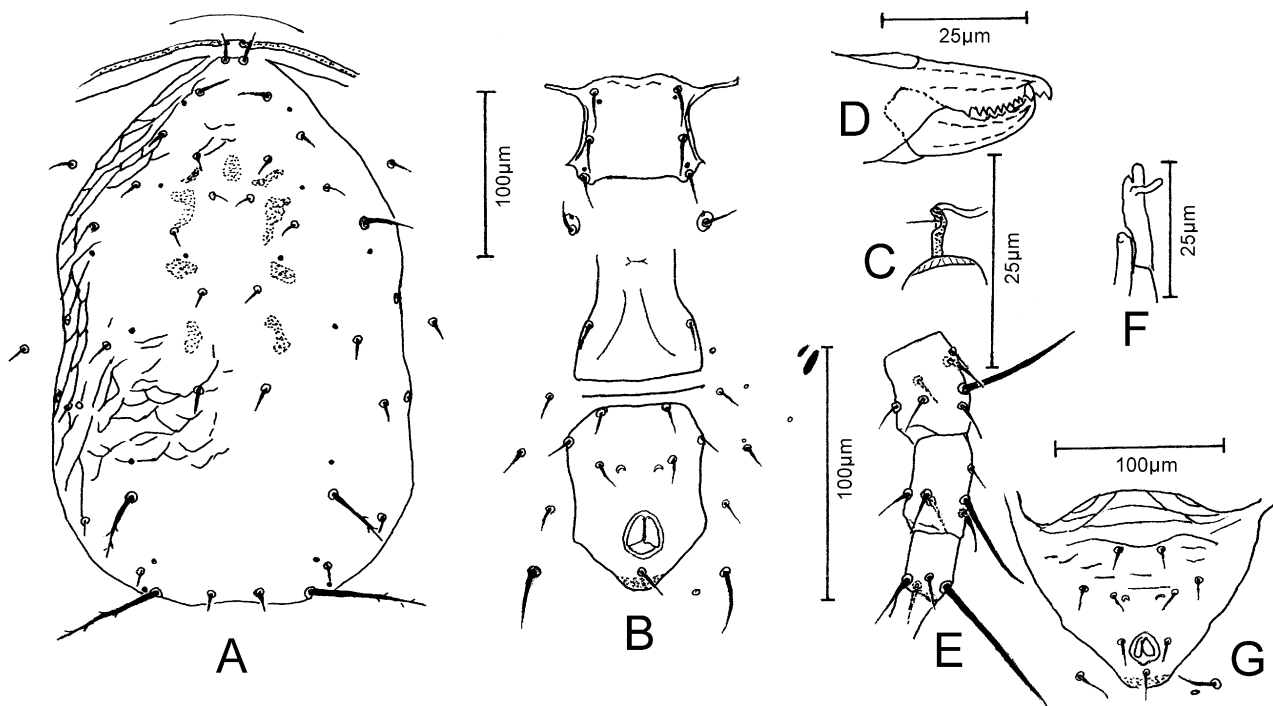


FIGURE 16. *Typhlodromips culmulus* (Van der Merwe): A. Female dorsal shield; B. Female ventral surface; C. Spermatheca; D. Female chelicera; E. Female leg IV; F. Spermatodactyl; G. Male ventrianal shield.

Typhlodromips extrasetus Moraes, Oliveira & Zannou

Typhlodromips extrasetus Moraes, Oliveira & Zannou, 2001a: 4; Moraes *et al.*, 2004: 212; Chant & McMurtry, 2005b: 327.

Remarks. This species was described from specimens collected in Takon, Oueme Province, Benin, on *Morinda lucida*. No additional specimens were collected in this study.

World distribution. Benin.

Typhlodromips ibadanensis (Ueckermann & Loots)

(Fig. 17)

Amblyseius (*Amblyseius*) *ibadanensis* Ueckermann & Loots, 1988: 157.

Typhlodromips ibadanensis, Moraes *et al.*, 2004: 214; Chant & McMurtry, 2005b: 327.

Female. (Specimens measured. Benin: 3; Cameroon: 2; Ghana: 10; Kenya: 3; Malawi: 1; Mozambique: 1)

Dorsum. Dorsal shield reticulate, with reticulation more evident laterally, 322(302–339) long and 210(207–226) wide. Setae j1 17(13–21), j3 20(18–24), j4 10(8–11), j5 10(8–11), j6 11(11–13), J2 13(11–14), J5 9(8–13), z2 11(10–13), z4 12(11–13), z5 9(8–11), Z1 13(11–14), Z4 36(32–42), Z5 73(66–80), s4 28(24–34), S2 11(10–13), S4 9(8–11), S5 8(8–11), r3 16(14–18), R1 12(10–14). Setae smooth, except Z4 and Z5 which are serrate.

Venter. Sternal shield mostly smooth, except for few lateral striae, posterior margin slightly concave; distances between St1–St3 53(48–56), St2–St2 60(56–64). Genital shield smooth; distance between St5–St5

64(59–67). Ventrianal shield pentagonal, reticulate anteriorly to preanal pores, 107(96–117) long, 89(80–96) wide at level of Zv2 and 80(72–89) wide at level of anus, elliptical preanal pores mesad and slightly posterior to Jv2. Two pairs of metapodal shields. Ventral setae smooth.

Chelicera. Movable digit 28(27–28) long, with 3 teeth; fixed digit 24 (23–25) long, with 8 teeth and a *pilus dentilis*.

Spermatheca. Calyx dome-shaped, 9(8–10) long; atrium kidney-shaped.

Legs. Tip of macrosetae of genua I–IV and of tibia and tarsus IV with tiny knobs; tip of other macrosetae blunt; Sge I: 28(26–32), Sge II 25(24–29), Sge III 30(26–32), Sti III 23(21–26), Sge IV 48(43–53), Sti IV 37(32–42), St IV 61(54–67). Chaetotaxy: genu II: 2-2/0,2/0-1; genu III: 1-2/1,2/0-1.

Specimens examined. Benin: International Institute of Tropical Agriculture (IITA) Cotonou Research Station, on unknown plant, 02-XI-1989, I.D. Zannou; Ikpilè, on *Byrsocarpus coccineus*, 11-XI-1991, A. Onzo. Cameroon: 1 km SW Nkoteng, Central Province, on unknown plant, 15-II-1991, A. Onzo. Ghana: Kotoku, Accra, on *Tridax procumbens*, 07-XI-1989, G.J. de Moraes; Nsutun, on *Manihot esculenta*, 08-XI-1989, J.S. Yaninek; 18 km N Kumassi, Ashanti Region, on unknown plant, 09-XI-1989, G.J. de Moraes; 18 km N Kumassi, Ashanti Region, on *Centrosema pubescens*, 09-XI-1989, J.S. Yaninek; 15 km S Abuassi, Ashanti Region, on unknown plant, 10-XI-1989, J.S. Yaninek; 2 km W Jakobu, Ashanti Region, on *Vitis vinifera*, 10-XI-1989, J.S. Yaninek; Mankesim, Central Region, on unknown plant, 12-XI-1989, J.S. Yaninek. Malawi: 2.5 SE Mzuzu, Northern Province, on *Zea mays*, 04-V-2000, B. Eklou. Rwanda: 5 km N Ruhengeri, on *Ipomoea* sp. 08-XII-1989, J.S. Yaninek. Sierra-Leone: Port Loko, on *Z. mays*, 16-XII-1991, J.S. Yaninek.

World distribution. Benin, Cameroon, Ghana, Malawi, Nigeria, Rwanda, Sierra-Leone.

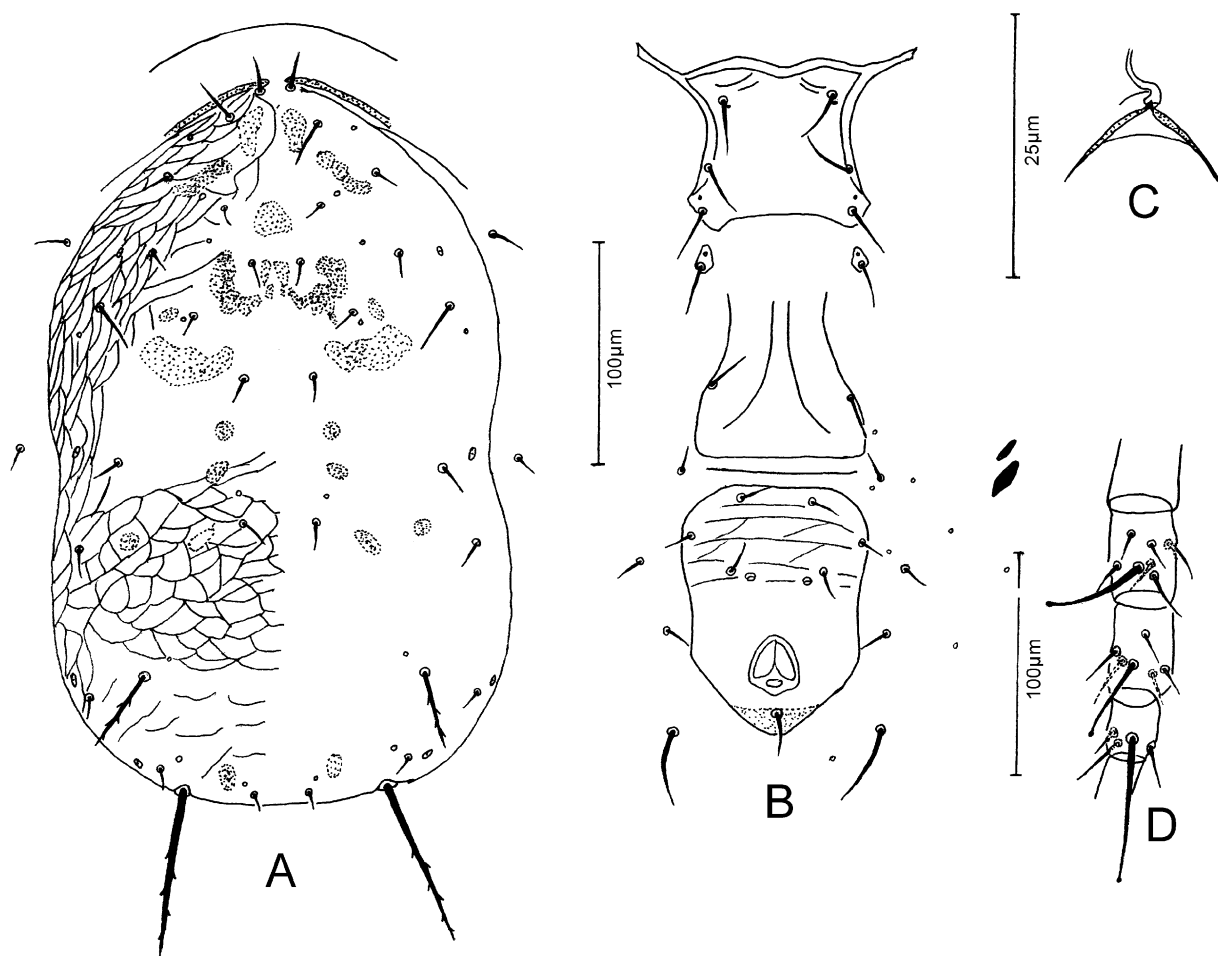


FIGURE 17. *Typhlodromips ibadanensis* (Ueckermann & Loots) (female): A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Leg IV.

Typhlodromips neoshi Moraes, Zannou & Oliveira, n. sp.

(Fig. 18)

Diagnosis. This species is characterized by having dorsal shield reticulate, ventrianal shield lightly striate anteriorly to preanal pores and reticulate posteriorly to those, ca. 90% as wide as long, fixed cheliceral digit with 8 teeth and calyx of spermatheca dish-shaped, without a distinct tubular section next to atrium.

Female. (2 specimens measured).

Dorsum. Dorsal shield reticulate anteriorly to Z4, and mostly smooth, with few transverse striae posteriorly, 366(355–376) long and 226(226–227) wide. Setae j1 18, j3 22, j4 14, j5 14, j6 16, J2 19, J5 9(8–10), z2 18(18–19), z4 19, z5 15(14–16), Z1 18(18–19), Z4 37, Z5 72, s4 31(30–32), S2 16, S4 12(11–13), S5 10(10–11), r3 20(19–21), R1 17(16–18). Setae smooth, except Z4 and Z5 which are serrate.

Venter. Sternal shield smooth, posterior margin slightly concave; distances between St1–St3 54, St2–St2 64. Genital shield smooth; distance between, St5–St5 64(62–66). Ventrianal shield pentagonal, lightly striate anteriorly to preanal pores and reticulate posteriorly to those; with or without lateral constriction, anterior margin convex, 118(117–118) long, 108(104–112) wide at level of Zv2 and 93 wide at level of anus, elliptical preanal pores slightly posteromesad to Jv2. Two pairs of metapodal shields. Ventral setae smooth.

Chelicera. Movable digit 30 long, with 3 teeth; fixed digit 27 long, with 8 teeth and a *pilus dentilis*.

Spermatheca. Calyx dish-shaped, 2 long, 15 in diameter; atrium kidney-shaped.

Legs. Tip of macrosetae of genua I–IV and of tarsus IV with tiny knobs; tip of other macrosetae blunt; Sge I 27, Sge II 24, Sge III 27(26–29), Sti III 22(21–22), Sge IV 42, Sti IV 32, St IV 54(53–56). Chaetotaxy: genu: II 2-2/0,2/0-1; genu III: 1-2/1,2/0-1.

Male. (1 specimen measured).

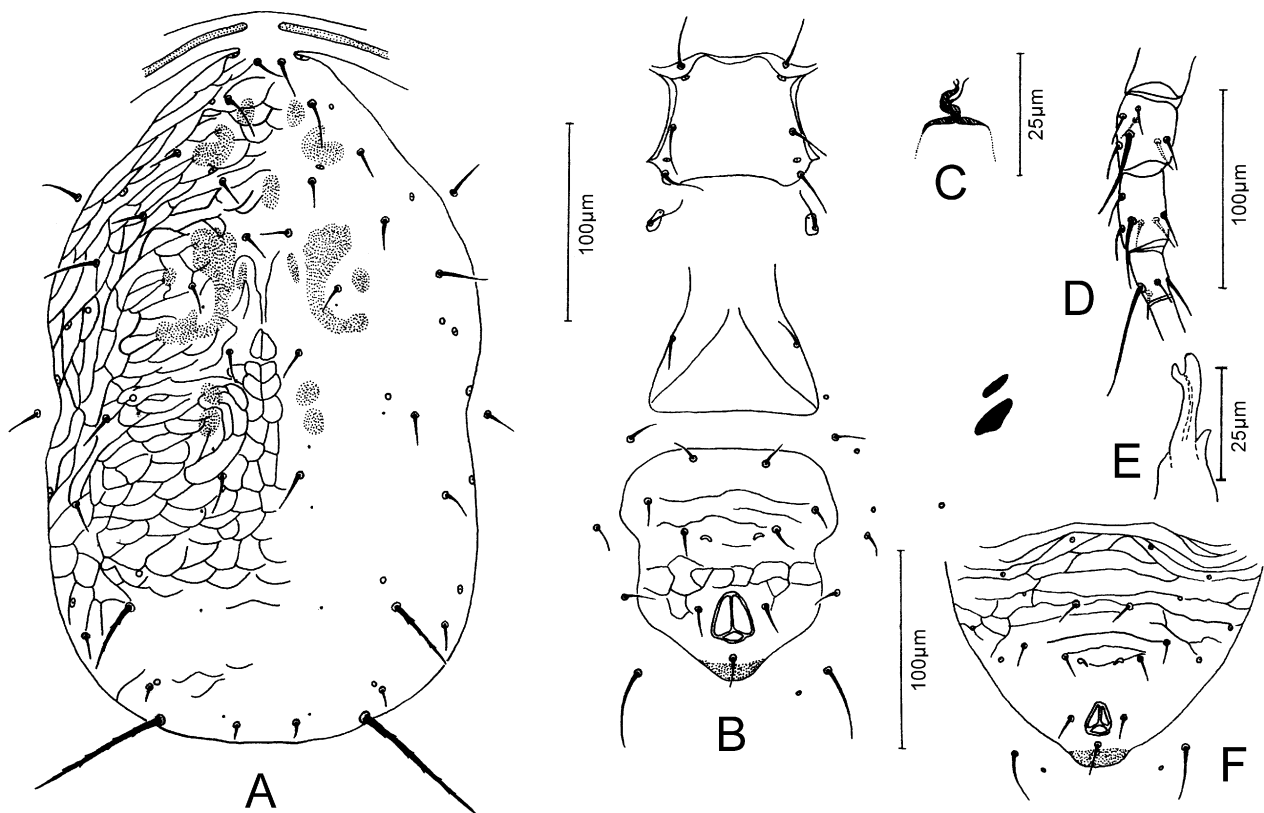


FIGURE 18. *Typhlodromips neoshi* Moraes, Zannou & Oliveira, n. sp.: A. Female dorsal shield; B. Female ventral surface; C. Spermatheca; D. Female leg IV; E. Spermatodactyl; F. Male ventrianal shield.

Dorsum. Dorsal shield pattern as in female, 272 long and 197 wide. Setae j1 16, j3 22, j4 11, j5 11, j6 13, J2 16, J5 5, z2 13, z4 16, z5 10, Z1 14, Z4 32, Z5 54, s4 26, S2 11, S4 8, S5 8, r3 18, R1 11. Setae smooth, except Z4 and Z5 which are serrate.

Venter. Ventrianal shield subtriangular, reticulate anteriorly to preanal pores, 130 long, 160 wide at the anterior corners, with 3 pairs of preanal setae, 5 pairs of lyrifissures (1 directly anterior to Jv1, 2 anterolaterad to Jv1, 1 anterolaterad to Zv2 and 1 posterolaterad to Zv2), elliptical preanal pores mesad and slightly posterior to Jv2.

Spermatodactyl. Shaft 20 long.

Legs. Tip of macrosetae of genua I–IV and of tarsus IV with tiny knobs; tip of other macrosetae blunt; Sge I 16, Sge II 19, Sge III 19, Sti III 16, Sge IV 29, Sti IV 24 and St IV 40. Chaetotaxy of genua II and III as in female.

Locality and type material. Holotype female, 1 paratype female and 1 allotype male from *Citrus* sp., Kigali, ISAR-Karama Station, Rwanda, 09-XII-1989, J.S. Yaninek, deposited at ESALQ-USP.

Etymology. The epithet *neoshi* refers to the similarity between this species and *Typhlodromips shi* (Pritchard & Baker).

Remarks. *Typhlodromips shi* (Pritchard & Baker, 1962) has generally shorter dorsal setae, ventrianal shield narrower and smooth or with few and light striae anteriorly to preanal pores. *Typhlodromips ibadanensis* (Ueckermann & Loots, 1988) differs from this new species by having ventrianal shield reticulate anteriorly to preanal pores compared to lightly striate anteriorly to preanal pores and reticulate posteriorly to those in *T. neoshi*, and calyx of spermatheca dome-shaped.

***Typhlodromips neoswellendamensis* Moraes, Zannou & Oliveira, n. sp.**
(Fig. 19)

Diagnosis. This species is characterized by having reticulate dorsal shield; all dorsal setae smooth, except Z5, which is serrate; sternal shield mostly smooth, with few lateral striae; ventrianal shield reticulate; 1 pair of metapodal shields; calyx of spermatheca cup-shaped; Sge IV about as long as Sti IV and both ca. 50% as long as St IV.

Female. (1 specimen measured).

Dorsum. Dorsal shield with faint reticulation on anterior half and with distinct reticulation on posterior half, 424 long and 238 wide. Setae j1 29, j3 32, j4 14, j5 11, j6 broken, J2 19, J5 11, z2 19, z4 16, z5 13, Z1 19, Z4 46, Z5 77, s4 42, S2 26, S4 22, S5 16, r3 21, R1 22. All setae smooth, except Z5 which is serrate.

Venter. Sternal shield mostly smooth, with few lateral striae; posterior margin irregular and slightly concave; distances between St1–St3 83, St2–St2 85. Genital shield smooth; distance between St5–St5 85. Ventrianal shield pentagonal, reticulate; anterior margin slightly convex, 128 long, 118 wide at level of Zv2 and 105 wide at level of anus, preanal pores posterior to and approximately vertically aligned with Jv2. A single pair of distinct metapodal shields. Ventral setae smooth.

Chelicera. Movable digit 45 long, with 2 teeth; fixed digit 40 long, with 7 teeth and a *pilus dentilis*.

Spermatheca. Calyx cup-shaped, 9 long; atrium small.

Legs. Sharp-tipped macrosetae; Sge II 29, Sge III 29, Sti III 27, Sge IV 46, Sti IV 45, St IV 91. Chaetotaxy: genu II: 2–2/0,2/1–1; genu III: 1–2/0,2/1–1.

Male. Unknown.

Locality and type material. Holotype female from unknown plant, 39 km W Nakuru, Valley Province, Kenya, 04-XII-1989, J.S. Yaninek, deposited at ESALQ-USP.

Etymology. The epithet *neoswellendamensis* refers to the similarity between this new species and *Typhlodromips swellendamensis* (Ueckermann & Loots).

Remarks. *Typhlodromips swellendamensis* (Ueckermann & Loots, 1988) and *Typhlodromips tee* (Schicha, 1983) differ from this new species by having dorsal shield centrally smooth, sternal and ventrianal shields smooth and 2 pairs of metapodal shields. In addition, *T. tee* has movable and fixed cheliceral digits with 3 and 10 teeth, respectively.

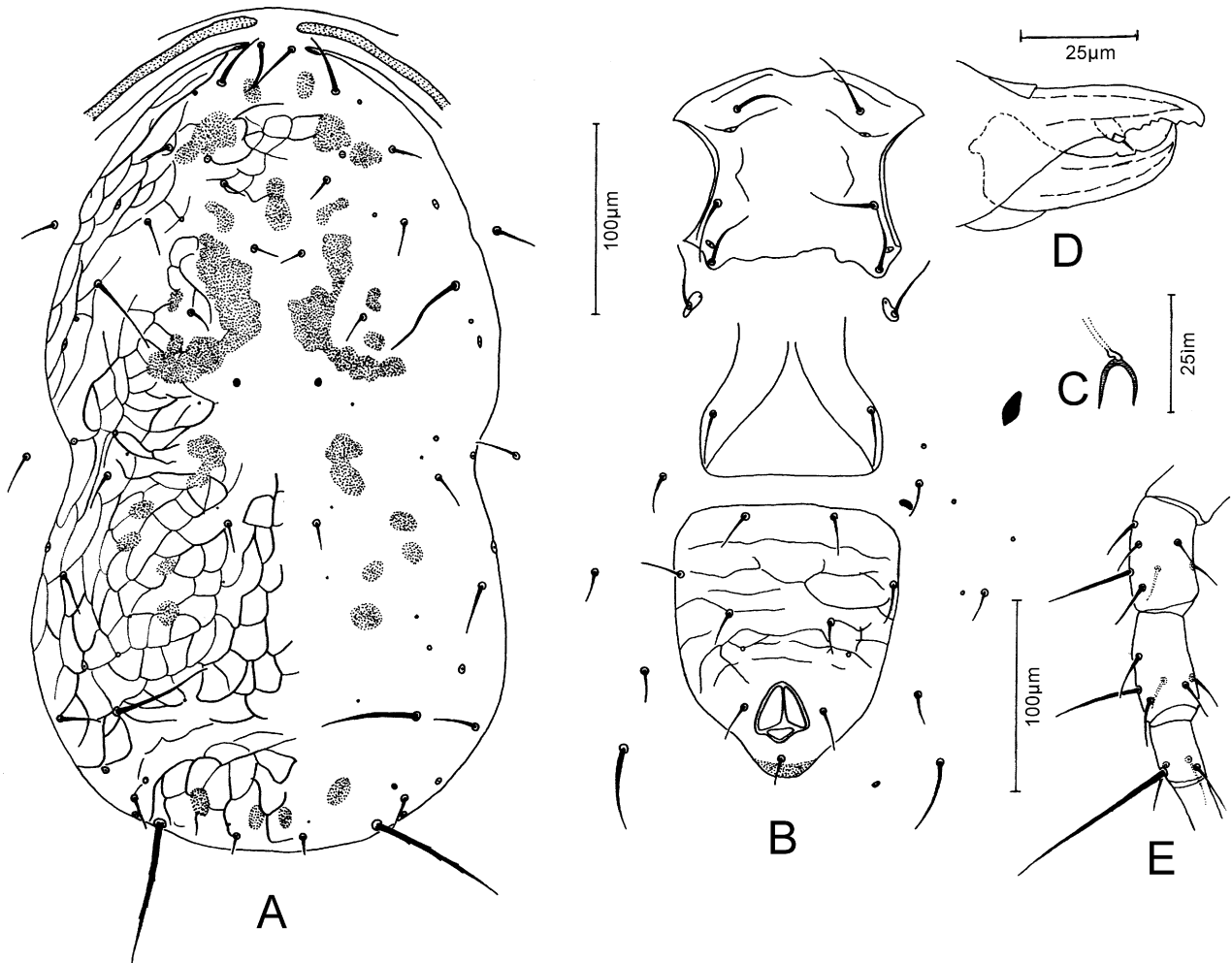


FIGURE 19. *Typhlodromips neoswellendamensis* Moraes, Zannou & Oliveira, n. sp. (female): A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Chelicera; E. Leg IV.

***Typhlodromips robusticalyx* Moraes, Zannou & Oliveira, n. sp.**

(Fig. 20)

Diagnosis. This new species is characterized by having dorsal shield mostly smooth and without distinct constriction at level of seta R1; ventrianal shield vase-shaped and striate on anterior half; calyx of spermatheca funnel-shaped and stout; atrium long and vacuolate; movable and fixed cheliceral digits with 4 and 10 teeth, respectively.

Female. (5 specimens measured).

Dorsum. Dorsal shield mostly smooth, except for few anterolateral striae, without distinct constriction at level of seta R1, 356(339–384) long and 257(245–264) wide. Setae j1 22(19–26), j3 28(26–30), j4 10(10–11), j5 9(8–10), j6 10(8–11), J2 14(13–14), J5 10, z2 11(10–13), z4 12(10–14), z5 10(8–11), Z1 17(14–19), Z4 47(43–53), Z5 94(86–98), s4 37(34–40), S2 15(14–16), S4 14(13–14), S5 11(10–13), r3 17(16–19), R1

11(10–13). All setae smooth, except Z5 which is serrate.

Venter. Sternal shield mostly smooth, except for few lateral striae; posterior margin straight; distances between St1–St3 57(53–62), St2–St2 68(66–70). Genital shield smooth; distance between St5–St5 72(67–75). Ventrianal shield vase-shaped, striate on anterior half, anterior margin convex, 114(109–120) long, 69(61–82) wide at level of Zv2 and 76(74–82) wide at level of anus, elliptical preanal pores slightly posteromesad to Jv2. Two pairs of metapodal shields. Ventral setae smooth.

Chelicera. Movable digit 31 long, with 4 teeth; fixed digit 27 long, with 10 teeth and a *pilus dentilis*.

Spermatheca. Calyx funnel-shaped, stout 16(15–16) long; atrium vacuolate.

Legs. Sharp-tipped macrosetae; Sge I 32(29–34), Sge II 35(32–37), Sge III 50(45–53), Sti III 33(32–35), Sge IV 74(70–77), Sti IV 33(32–35), St IV 62(61–64). Chaetotaxy: genu: II 2-2/0,2/0-1; genu III: 1-2/1,2/0-1.

Male. Unknown.

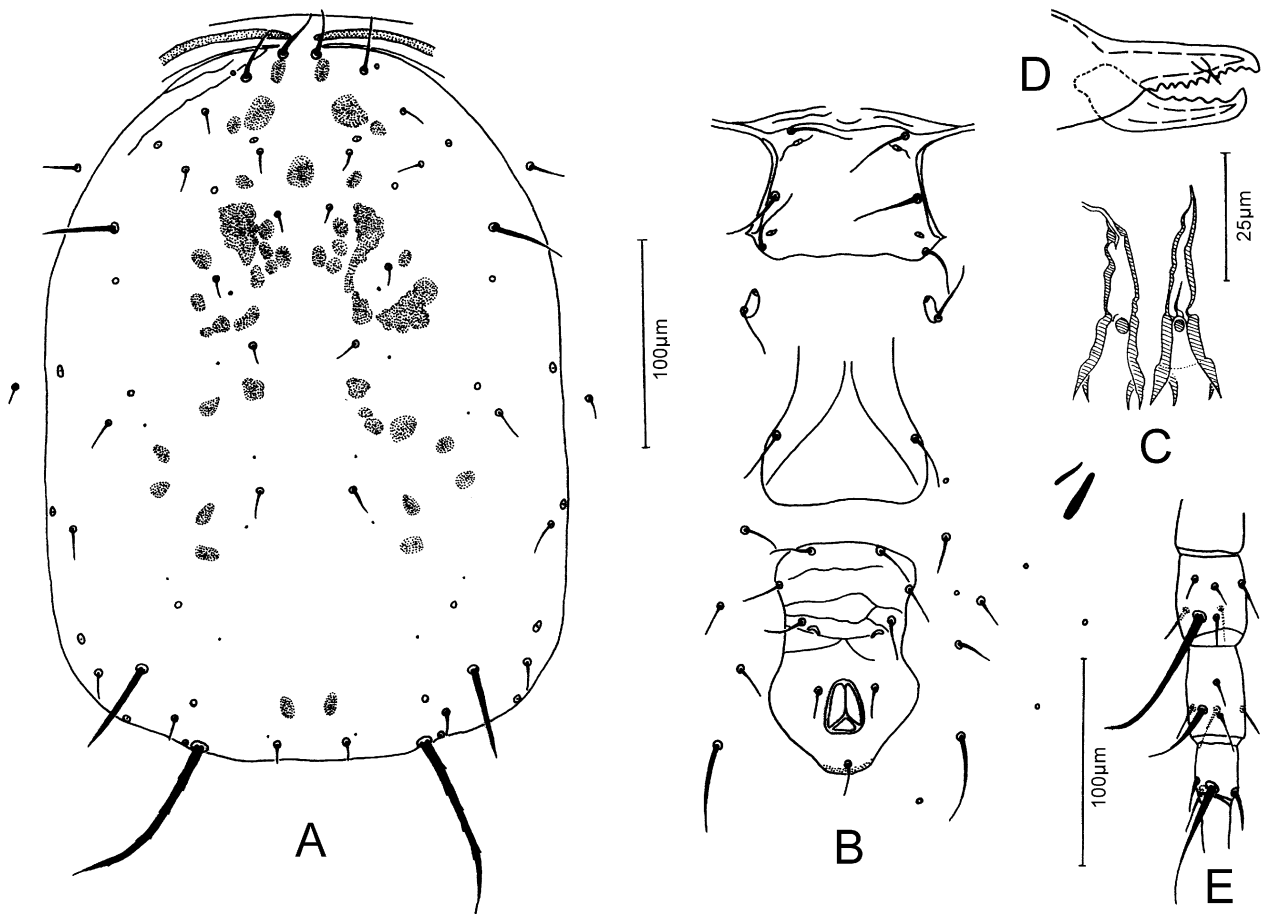


FIGURE 20. *Typhlodromips robusticalyx* Moraes, Zannou & Oliveira, n. sp. (female): A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Chelicera; E. Leg IV.

Locality and type material. Holotype female from unknown plant, 28 km S Dunkwa, Western Region, Ghana, 11-XI-1989, J.S. Yaninek, deposited at ESALQ-USP. One paratype female from *Elaeis guineensis*, 28 km S Dunkwa, Western Region, Ghana, 11-XI-1989, J.S. Yaninek, deposited at IITAIM. One paratype female from *Securinea virosa*, Agbotagon, Atlantic Province, Benin, 10-X-1991, B. Eklou, deposited at IITAIM. One paratype female from *Anacardium occidentale*, Bo China Farm, Sierra-Leone, 14-XII-1991, B. Kristensen, deposited at IITAIM. One paratype female from *Coffea* sp., 34 km S Masaka, Uganda, 05-X-1990, J.S. Yaninek, deposited at ESALQ-USP.

Etymology. The epithet *robusticalyx* refers to the shape of the calyx of the types of this species.

Remarks. Similarly to this new species, *Typhlodromips lambatinus* (Schicha & Corpuz-Raros, 1992), *T. mitassini* (Chant & Hansell, 1971) and *T. sinensis* Denmark & Muma, 1972 also have ventrianal shield vase-shaped, which is uncommon for species in this genus. However, in all of those species a small but distinct constriction is observed at level of seta R1, and the ventrianal shield is smooth. In addition, *T. lambatinus* has an extra dorsal shield seta, on one side, regarded as a “freak feature” and its dorsal shield is reticulate; *T. mitassini* has spermatheca very small and poorly sclerotized and it has seta z2 almost as long as the distance between its base and the base of s4. *Typhlodromips sinensis* does not have stout calyx and vacuolate atrium.

***Typhlodromips shi* (Prichard & Baker)**

(Fig. 21)

Amblyseius (*Amblyseius*) *shi* Prichard & Baker, 1962: 252; Ueckermann & Loots, 1988: 157.

Amblyseius shi, Moraes *et al.*, 1989: 83.

Typhlodromips shi, Moraes *et al.*, 2004: 224; Chant & McMurtry, 2005b: 327.

Amblyseius (*Amblyseius*) *ivoloinae* Blommers 1974: 146 (synonymy according to Ueckermann & Loots, 1988).

Female. (Specimens measured. Benin: 3; Cameroon: 2; Ghana: 10; Kenya: 3; Mozambique: 1; Democratic Republic of Congo: holotype)

Dorsum. Dorsal shield reticulate anteriorly to Z4, and mostly smooth, with scanty striae posteriorly, 332(310–347) [330] long and 217(200–226) [204] wide. Setae j1 16(13–21) [16], j3 19(16–24) [19], j4 10(8–13) [11], j5 10(8–11) [10], j6 12(10–13) [11], J2 13(11–14) [12], J5 8(8–10) [8], z2 12(11–13) [13], z4 12(10–13) [13], z5 10(8–11) [9], Z1 13(13–14) [14], Z4 31(22–37) [31], Z5 67(53–74) [67], s4 21(16–26) [18], S2 11(8–13) [12], S4 10(8–13) [11], S5 9(8–10) [9], r3 14(11–16) [14], R1 11(8–13) [10]. Setae smooth, except Z4 and Z5 which are serrate.

Venter. Sternal shield mostly smooth, with few lateral striae; posterior margin slightly concave, distances between St1–St3 54(50–58) [53], St2–St2 63(59–66) [63]. Genital shield smooth, distance between St5–St5 65(59–70) [66]. Ventrianal shield pentagonal, smooth or with few transverse striae anteriorly to preanal pores, 108(94–115) [110] long, 84(74–94) [82] wide at level of Zv2 and 79(72–86) [78] wide at level of anus, elliptical preanal pores mesad and about in line with Jv2. Two pairs of metapodal shields. Ventral setae smooth.

Chelicera. Movable digit 27(27–28) long, with 3 teeth; fixed digit 23 (23–24) long, with 8 teeth and a *pilus dentilis*.

Spermatheca. Calyx dish-shaped, 6(5–8) long, 13(13–14) in diameter; atrium kidney-shaped.

Legs. Tip of macrosetae of genua I–IV and of tarsus IV with tiny knobs; tip of other macrosetae blunt; Sge I: 26(22–30) [27], Sge II 23(19–29) [24], Sge III 29(24–32) [28], Sti III 23(19–24) [24], Sge IV 42(35–48) [41], Sti IV 33(26–40) [34], St IV 52(42–67) [46]. Chaetotaxy: genu II: 2–2/0,2/0–1; genu III: 1–2/1,2/0–1.

Specimens examined. Benin: International Institute of Tropical Agriculture (IITA) Cotonou Research Station, on *Chromolaena odorata*, 02-XI-1989, I.D. Zannou; Agbotagon, on *Macrosphyra longistyla*, 12-VIII-1991, B. Eklou. Cameroon: 52 km N Kribi, on *Elaeis guineensis*, 08-II-1991, L. Louis. Democratic Republic of Congo (Belgian Congo): Stanleyville, Eastern Province, Zaire, on *Afromomum* sp., 20-IV-1955, E.W. Baker. Ghana: Nsutam, on *Manihot esculenta*, 08-XI-1989, J.S. Yaninek; 2 km W Jakobu, Ashanti Region, on *Ageratum conyzoides*, 10-XI-1989, J.S. Yaninek; Somanya, on *Chromolaena odorata*, 13-XI-1989, J.S. Yaninek; Somanya, on unknown plants, 13-XI-1989, G.J. de Moraes. Kenya: 3 km N Lunga Lunga, Coastal Province, on *Musa sapientum*, 29-XI-1989; J.S. Yaninek; 8 km N Kinango, on *Cassia* sp. 29-XI-1989, J.S. Yaninek. Mozambique: 8 km S Movia, on *A. conyzoides*, 29-IV-2001, B. Agboton. Sierra-Leone: Port Loko, on *Zea mays*, 16-XII-1991, J.S. Yaninek.

World distribution. Angola, Benin, Democratic Republic of Congo, Ghana, Kenya, Mozambique, Nigeria and Sierra-Leone.

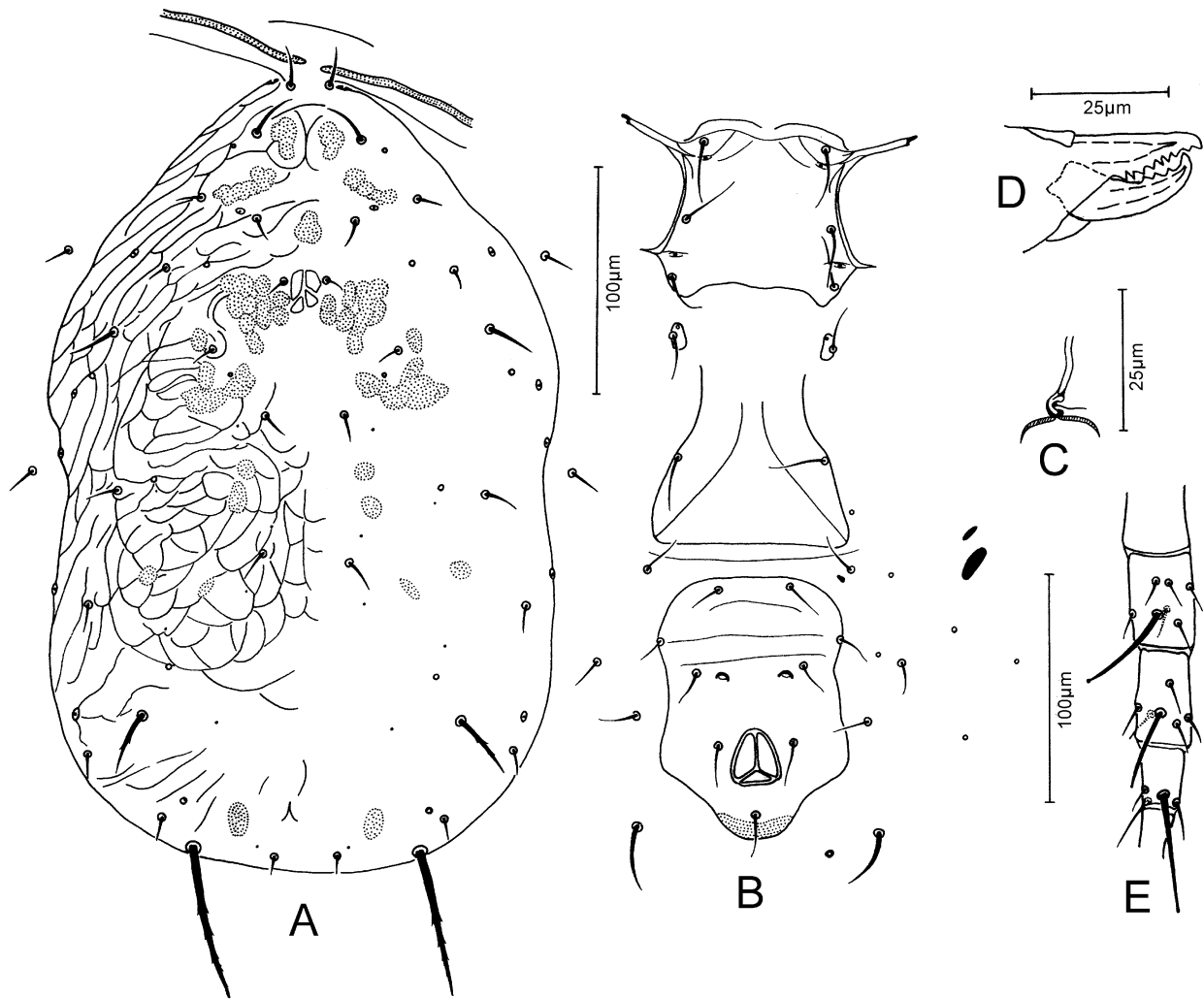


FIGURE 21. *Typhlodromips shi* (Prichard & Baker) (female): A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Chelicera; E. Leg IV.

***Typhlodromips swellendamensis* (Ueckermann & Loots)**
(Fig. 22)

Amblyseius (*Amblyseius*) *swellendamensis* Ueckermann & Loots, 1988: 137.
Amblyseius swellendamensis, Moraes *et al.*, 2004: 52.
Typhlodromips swellendamensis, Chant & McMurtry, 2005b: 327.

Female. (Specimens measured. South Africa: 9 and holotype)

Dorsum. Dorsal shield striate-reticulate laterally and posteriorly, smooth centrally, 383(353–413) [413] long and 213(198–225) [225] wide. Setae j1 32(32–35) [35], j3 41(38–44) [44], j4 16 [16], j5 16(13–16) [16], j6 17(16–19) [16], J2 17(16–19), J5 12(11–13) [12], z2 23(22–25) [23], z4 22 [22], z5 15(13–16) [15], Z1 23(22–25) [23], Z4 52(47–55) [55], Z5 72(69–76) [76], s4 46(42–54) [49], S2 38(35–41) [40], S4 34(32–38) [35], S5 21(16–25) [23], r3 22(22–25) [22], R1 27(25–32) [32]. Setae smooth, except Z5 which is serrate.

Venter. Sternal shield mostly smooth, except for few lateral striae, posterior margin straight, distances between St1–St3 69(66–74) [74], St2–St2 74(69–79) [79]. Genital shield smooth; distance between St5–St5 73(66–82). Ventrianal shield pentagonal, smooth, anterior margin slightly convex, 130(120–139) long,

105(98–113) wide at level of Zv2 and 90(79–101) [101] wide at level of anus, small preanal pores posterolaterad to Jv2. Two pairs of metapodal shields. Ventral setae smooth.

Chelicera. Movable digit 43(41–46) [41] long, with 2 teeth; fixed digit 37(33–41) [41] long, with 5–6 teeth and a *pilus dentilis*.

Spermatheca. Calyx cup-shaped, 10(8–9) [9] long; atrium appressed to the base of the calyx.

Legs. Sharp-tipped macrosetae; Sge II 31(28–32) [31], Sge III 31(28–32) [31], Sti III 28(25–30) [28], Sge IV 46(44–49) [49], Sti IV 41(38–44) [44], St IV 80(76–88) [88]. Chaetotaxy: Sge II: 2–2/0, 2/0–1; Sge: III 1–2/1, 2/0–1.

Specimens examined. South Africa: Swellendam, Western Cape Province, from *Citrus* sp., 2-VIII-1976, S. Kambarov (holotype and 2 paratypes); Silver mine Nature Reserve, Cape Town, Western Cape Province, from *Pinus radiata*, 08-III-1983, D.P. Keetch; 20 km from Machadodorp, Mpumalanga Province, from an unknown plant, 25-VIII-1981, E.A. Ueckermann; Ebenezer Dam near Tzaneen, Limpopo Province, from *Castanea sativa*, 24-V-1983, E.A. Ueckermann; Ebenezer Dam near Tzaneen, Limpopo Province, from *Spiraea cantoniensis*, 24-V-1983, E.A. Ueckermann.

Remarks. Although in the original description it was mentioned that 1 and 4 teeth were found on the movable and fixed digits, respectively, a re-examination of the types and of additional specimens collected showed that the correct numbers were 2 and 5–6 teeth, respectively.

World distribution. South Africa.

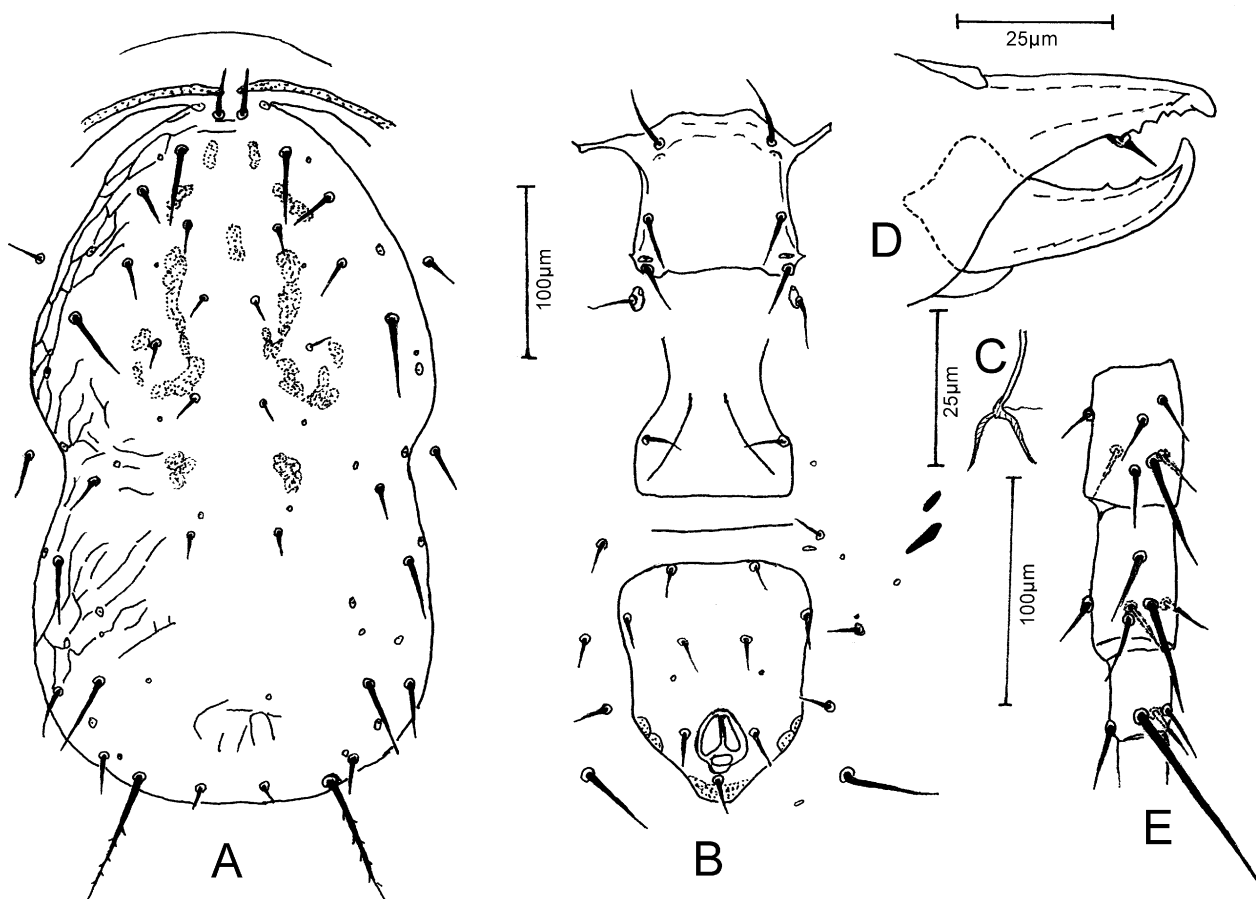


FIGURE 22. *Typhlodromips swellendamensis* (Ueckermann & Loots) (female): A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Chelicera; E. Leg IV.

Key to genera and species of the tribe Typhlodromipsini treated in this paper

- 1 Sum of the ratios “length of dorsal shield/ length of S4” and “length of dorsal shield/ length of S5” smaller than 25.7; setae z2 and z4 at least as long as distances between their bases and the bases of setae next behind *Aristadromips* Chant & McMurtry ... 2
- Sum of the ratios “length of dorsal shield/ length of S4” and “length of dorsal shield/ length of S5” larger than 26; setae z2 and z4 much shorter than distances between their bases and the bases of setae next behind 3
- 2 Calyx of spermatheca bowl-shaped, ventrianal shield smooth, macrosetae on leg IV slightly knobbed-tipped *A. cydonus* (Ueckermann & Loots)
- Calyx of spermatheca bell-shaped, ventrianal shield reticulate, macrosetae on leg IV sharp-tipped..... *A. aberdaresensis* **n. sp.**
- 3 Dorsal shield usually with a constriction at level of seta R1; female with seta R1 not inserted on dorsal shield; dorsal idiosomal setae (except Z4 and/ or Z5) of variable lengths *Typhlodromips* De Leon ... 4
- Dorsal shield without constriction at level of seta R1; female with seta R1 inserted on dorsal shield; dorsal idiosomal setae short and subequal (except Z4 and Z5, which are longer) 11
- 4 Seta J1 present *T. extrasetus* Moraes, Oliveira & Zannou
- Seta J1 absent..... 5
- 5 Dorsal shield mostly smooth, with few anterolateral striae; calyx of spermatheca funnel-shaped, stout; atrium vacuolate..... *T. robusticalyx* **n. sp.**
- Dorsal shield totally or laterally reticulate or striate; calyx of spermatheca not funnel-shaped or stout; atrium not vacuolate 6
- 6 Calyx of spermatheca cup-shaped, at least 1.2 times as long as its diameter; Sge IV about as long as Sti IV 7
- Calyx of spermatheca dish- or dome-shaped, at most 0.6 times as long as its diameter; Sge IV longer than Sti IV..... 8
- 7 Central region of dorsal shield and whole ventrianal shield smooth; 2 pairs of metapodal shields..... *T. swellendamensis* (Ueckermann & Loots)
- Dorsal and ventrianal shields reticulate; 1 pair of metapodal shields..... *T. neoswellendamensis* **n. sp.**
- 8 Calyx of spermatheca dome-shaped; ventrianal shield reticulate anteriorly to preanal pores..... *T. ibadanensis* (Ueckermann & Loots)
- Calyx of spermatheca dish-shaped, with or without a tubular section next to the atrium; ventrianal shield smooth or with light striation anteriorly to preanal pores..... 9
- 9 Calyx of the spermatheca with a tubular section next to the atrium; fixed cheliceral digit with 12 teeth *T. culmulus* (Van der Merwe)
- Calyx of the spermatheca without a distinct tubular section next to atrium; fixed cheliceral digit with 8 teeth 10
- 10 Ventrianal shield lightly striate anteriorly to preanal pores and reticulate posteriorly to those, with or without distinct lateral constriction, ca. 90% as wide as long *T. neoshi* **n. sp.**
- Ventrianal shield smooth or with few transverse striae only anteriorly to preanal pores, without lateral constriction, ca. 80% as wide as long *T. shi* (Pritchard & Baker)
- 11 Seta J1 present; seta s4 at least twice as long as most other lateral setae ... *Afrodromips* Chant & McMurtry *A. tanzaniensis* (Yoshida-Shaul & Chant)
- Seta J1 absent; s4 less than twice as long as other lateral setae ... *Scapulaseius* Karg & Oomen-Kalsbeek *S. asiaticus* (Evans).

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