

PHYTOSEIID MITES OF THE GENUS *NEOSEIULUS* HUGHES (ACARI: PHYTOSEIIDAE) FROM SUB-SAHARAN AFRICA

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ABSTRACT - Thirty phytoseiid mite species of the genus *Neoseiulus* Hughes are reported from sub-Saharan Africa. Ten of these species are described for the first time and 14 nominal species are redescribed. Most of the species were collected from cassava groves in tropical Africa and from other habitats in South Africa. A key is included to distinguish these species and six other species known to occur in the region but not evaluated in this study.

Key words - Acari, Phytoseiidae, *Neoseiulus* Hughes, biological control, predator, cassava, taxonomy, Angola, Benin, Burundi, Cameroon, Democratic Republic of Congo, Ghana, Kenya, Malawi, Mozambique, Nigeria, Rwanda, Sierra-Leone, South Africa, Tanzania, Uganda, Zambia, Zimbabwe.

INTRODUCTION

In the early 1970, the Neotropical mite pest *Monychellus tanajoa* (Bondar) (Acari: Tetranychidae), the cassava green mite, was first found in East Africa (Nyiira, 1972) and quickly spread to most of the African countries where cassava is grown. In the early 1980, the International Institute of Tropical Agriculture (IITA) initiated a biological control program to combat *M. tanajoa* (Yaninek and Herren, 1988). Surveys were conducted by IITA personnel in cassava habitats in several sub-Saharan cassava-growing countries from 1986 to 2002 to identify the species composition of the mite fauna before and after the introduction of exotic phytoseiid mites from the Neotropics for the control of the cassava green mite. This paper is the third of a series dealing with the identification of phytoseiid mites, elaborated within the scope of the IITA program for the biological control of *M. tanajoa*. Previous papers in the series dealt with species of the genus *Euseius* (Moraes *et al.*, 2001) and in subtribes Typhlodromalina and Euseiina (Moraes *et al.*, 2006), respectively. The objective of the present paper is to report the phytoseiid mites of the genus *Neoseiulus* Hughes known from sub-Saharan Africa, with redescription of nominal species and descriptions of new species based

primarily on specimens found in the surveys previously reported, in addition to specimens collected in other projects by South African researchers. In every case, specimens were collected directly in the field using hand lenses, transferred to vials in 70% alcohol and later mounted in Hoyer's medium. A key is presented to distinguish the species in this genus known from sub-Saharan Africa. Moraes *et al.* (1989b) referred to specimens collected in Kenya as *Neoseiulus* aff. *marginatus* but the types of this species were not found and no specimens of this species were collected in this study. Therefore, we did not include this species.

The female idiosomal setal pattern of all the *Neoseiulus* species mentioned in this study is 10A:9B/JV-3:ZV (Chant and Yoshida-Shaul, 1992) which is the most common pattern for the genus (Chant and McMurtry, 2003).

Setal nomenclature follows that of Rowell *et al.* (1978) and Chant and Yoshida-Shaul (1991) for dorsal and ventral surfaces of the idiosoma, respectively. All measurements are given in micrometers (μm); 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, mea-

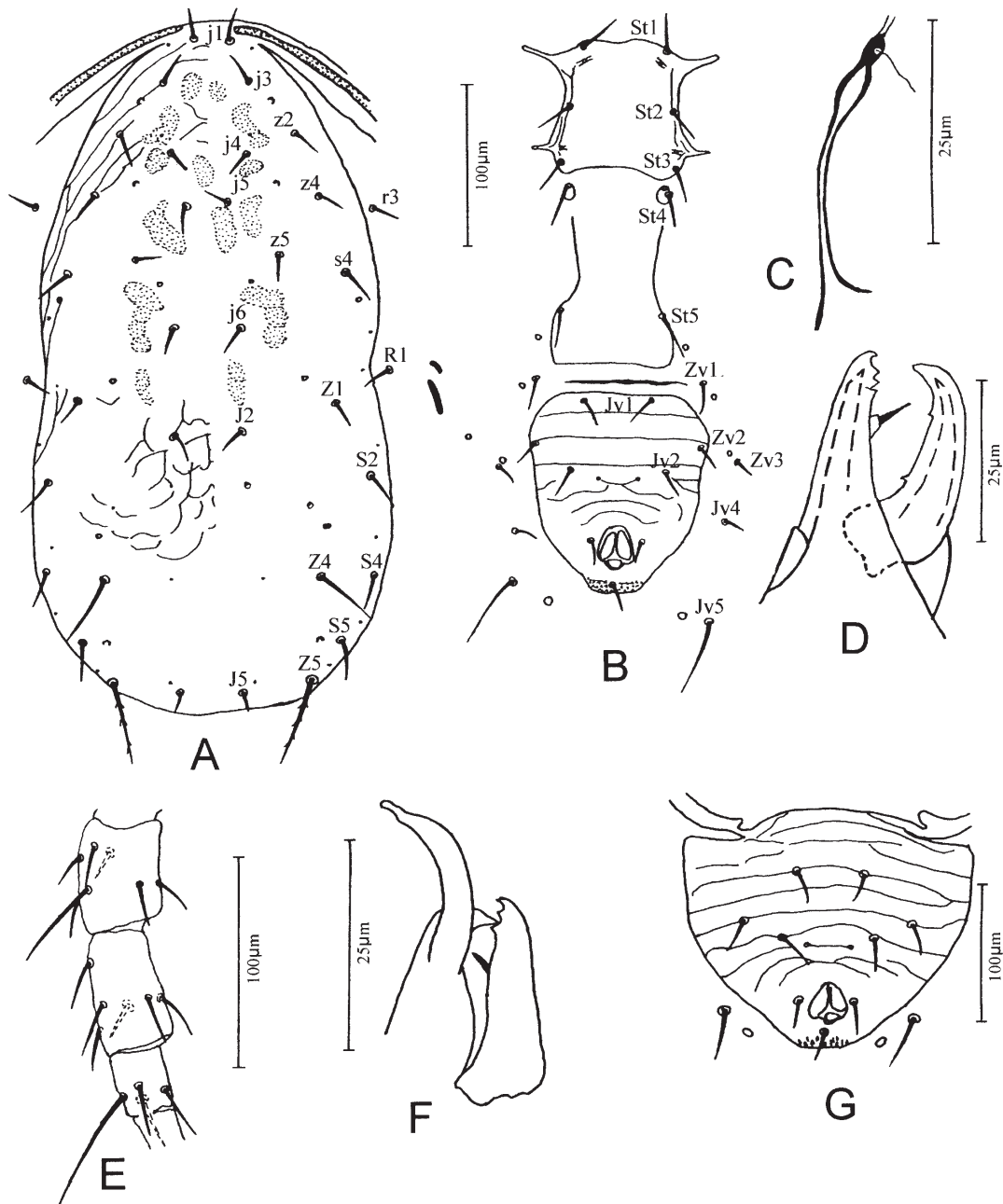


Fig. 1. *Neoseiulus accessus* (Ueckermann and Loots) - A. Female dorsal shield; B. Female ventral surface; C. Spermatheca; D. Female chelicera, E. Female leg IV; F. Spermatodactyl; G. Male ventrianal shield.

measurements of type specimens are provided (in brackets). The dorsal shield width was always taken at the widest level of the proscutum. Macrosetae for which measurements are not provided should be considered as absent.

Abbreviations used for deposition 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 from the present work and Moraes *et al.* (2004).

Neoseiulus Hughes

Neoseiulus Hughes, 1948: 141; Muma, 1961: 295 (in part); De Leon, 1965: 23; Ehara, 1966: 10 (in part);

- Muma and Denmark, 1968: 235; Ragusa and Athias-Henriot (1983): 660; Chant and McMurtry (2003): 15; Moraes *et al.* (2004): 98.
- Amathia* Chaudhri, Akbar and Rasool, 1979: 48; Chant and McMurtry (2003).
- Amblyseius* Berlese, Athias-Henriot, 1957: 336 (in part); Chant, 1965: 371 (in part).
- Amblyseius* (*Amblyseius*) Pritchard and Baker, 1962: 235 (in part).
- Amblyseius* (*Amblyseius*) section *Typhlodromopsis*, Wainstein, 1962: 15.
- Amblyseius* (*Neoseiulus*), Karg, 1983: 313; Ehara and Amano (1998) (in part).
- Amblyseius* (*Typhlodromopsis*) De Leon, 1959: 115 (in part), Muma, 1961: 287 (in part).
- Carinoseius* Wainstein, 1980: 149; Karg, 1983: 300.
- Cydnodromus* Muma, 1961: 290; Muma, 1967: 273.
- Denmarkia* Chaudhri, Akbar and Rasool, 1979: 46; Chant and McMurtry (2003).
- Dictyonotus* Athias-Henriot, 1978; Chant and McMurtry (2003).
- Dictydionotus* Athias-Henriot, 1979; Chant and McMurtry (2003).
- Kashmerius* Chaudhri, Akbar and Rasool, 1979: 66; Chant and McMurtry (2003).
- Phytodromus* Muma, 1961: 291; Denmark, 1993: 107 (in part); Chant and McMurtry (2003).
- Typhlodromopsis* Muma, 1965: 245.
- Typhlodromus* Scheuten, Chant, 1965: 368 (in part).
- Typhlodromus* (*Neoseiulus*), Nesbitt, 1951: 34; Hughes, 1961: 222.
- Typhlodromus* (*Neoseiulus*) section *Neoseiulus*, Wainstein, 1962: 21.
- Typhlodromus* (*Typhlodromopsis*) De Leon, 1959: 113 (in part).

***Neoseiulus accessus* (Ueckermann and Loots)
(Fig. 1)**

- Amblyseius* (*Amblyseius*) *accessus* Ueckermann and Loots, 1988: 150.
- Neoseiulus accessus*, Chant and McMurtry, 2003: 23; Moraes *et al.*, 2004: 98.

FEMALE - Three specimens measured (South Africa: 3).

Dorsum - Dorsal shield 322(315-328) long, 155 (151-158) wide, mostly smooth, with striations anterolaterally and reticulations between setae J2 and Z4. Setae j1 15(13-16), j3 15(13-16), j4 9, j5 9, j6 9, J2 12(11-13), J5 9, z2 13, z4 13, z5 9, Z1 13, Z4 32, Z5 44, s4 18(16-19), S2 19, S4 17(16-17), S5 19(18-19), r3 14(13-14), R1 14(13-14). All setae smooth, except Z4 and Z5, lightly serrate, Z4 appears smooth in most specimens.

Peritreme - Extending to level of j1.

Venter - Sternal shield smooth, posterior margin slightly concave; distances between St1-St3 59(59-60), St2-St2 51(50-52). Genital shield smooth; distance between St5-St5 52(50-54). Ventrianal shield pentagonal, with parallel transverse striae anterior to Jv2 and irregular striae posterior to Jv2, anterior margin almost straight, 110 long, 98(95-101) wide at level of Zv2 and 82 at level of anus, with a pair of small and round preanal pores posteromesad to Jv2. Two pairs of metapodal shields. Caudoventral setae smooth and sharp-tipped.

Chelicera - Movable digit 29(28-30) long, with 2 well-spaced teeth; fixed digit 26(25-28) long, with 3 teeth and a *pilus dentilis*.

Spermatheca - Calyx 34(32-35) long, bulging near nodular atrium, and flared near vesicle.

Legs - Macrosetae pointed distally; Sge IV 29(28-32), St IV 39(38-41). Chaetotaxy: genu II: 2-2/0, 2/0-1; genu III 1-2/1, 2/0-1.

MALE - Two specimens measured (South Africa: 2).

Dorsum - Dorsal shield 236(233-239) long, 141 (139-142) wide, shield pattern as in female. Setae j1 12(11-13), j3 13, j4 9, j5 9, j6 9, J2 9, J5 9, z2 13, z4 11, z5 9, Z1 11(9-13), Z4 25, Z5 32, s4 14, S2 16, S4 14(13-14), S5 14(13-14), r3 13, R1 13. All setae smooth, except Z4 and Z5, lightly serrate.

Peritreme - Extending to level of j1.

Venter - Ventrianal shield almost pentagonal, with transverse striae; 97(95-98) long and 111(110-112) wide at anterior corners; with 3 pairs of preanal setae, a pair of small round preanal pores posteromesad to Jv2, additional pores not observable.

Spermatodactyl - Shaft 18(16-19) long.

Legs - Macrosetae pointed distally; Sge IV 19, St IV 30(28-32). Chaetotaxy of genera II and III same as in female.

SPECIMENS EXAMINED - Four females and two males, **South Africa**: Blyde River Canyon, Mpumalanga Province, from *Lippia wilmsii* and *Dolichos trilobus*, 22 and 23-II-1978, E.A. Ueckermann.

DISTRIBUTION - South Africa.

***Neoseiulus agrestis* (Karg)
(Fig. 2)**

Typhlodromus agrestis Karg, 1960: 449.

Neoseiulus agrestis, Ragusa and Athias-Henriot, 1983: 666.

Neoseiulus agrestis, Chant and McMurtry, 2003: 35; Moraes *et al.*, 2004: 98.

FEMALE - One specimen measured (South Africa: 1). Karg's (1960) measurements are in brackets.

Dorsum - Dorsal shield 362 [377] long, 173 [182] wide, mostly smooth, with a few anterolateral striae. Setae j1 13[16], j3 19, j4 16, j5 16, j6 19, J2 19, J5 13, z2

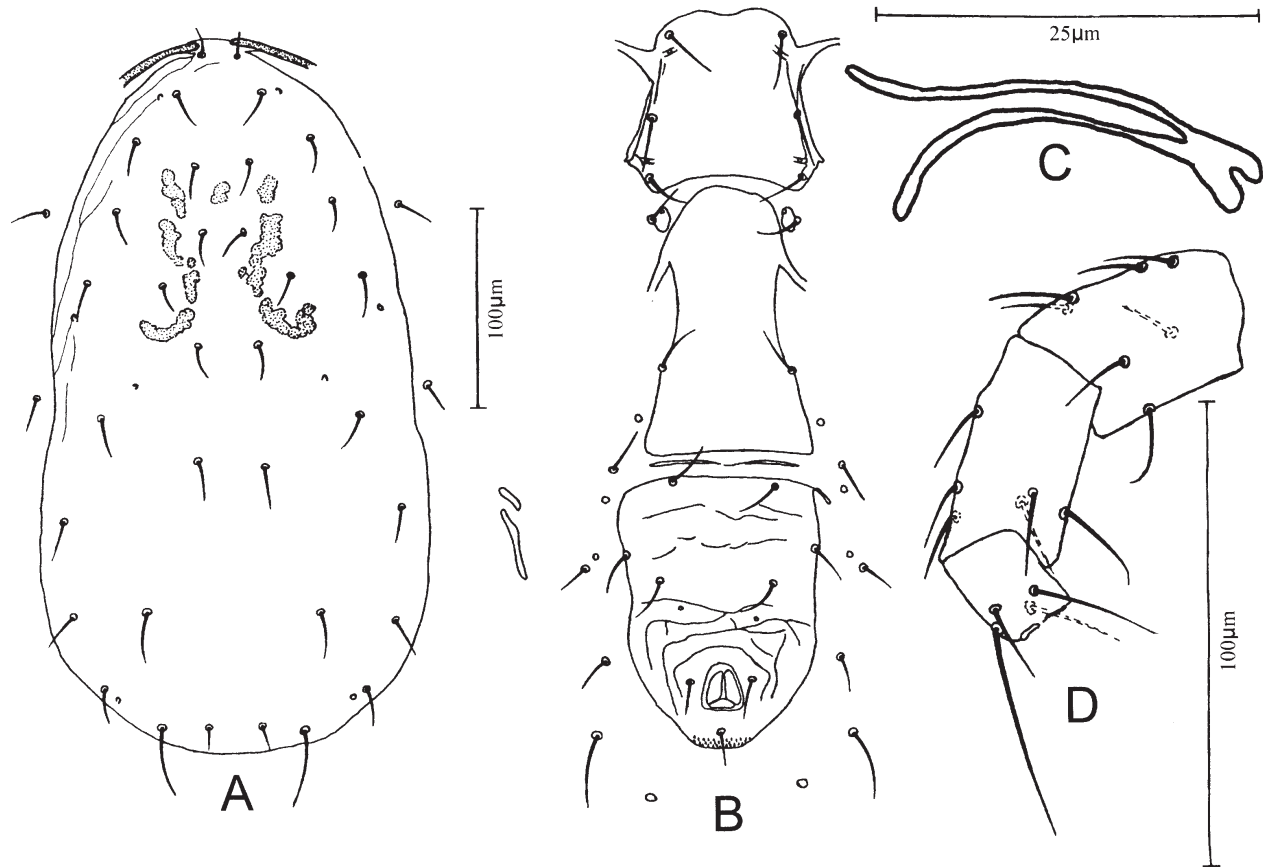


Fig. 2. *Neoseiulus agrestis* (Karg) (female) - A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Leg IV.

19, z4 19, z5 16, Z1 22[18], Z4 28[25], Z5 35[31], s4 22[21], S2 22, S4 22, S5 19, r3 19, R1 19. All setae smooth.

Peritreme - Extending anterior to j1.

Venter - Sternal shield smooth, posterior margin concave; distances between St1-St3 61, St2-St2 61. Genital shield smooth; distance between St5-St5 57. Ventrianal shield pentagonal, with few striae, anterior margin slightly concave, 123 long, 91 wide at level of Zv2 and 82 at level of anus, with a pair of round preanal pores posteromesad to Jv2. Two pairs of metapodal shields. Caudoventral setae smooth and sharp-tipped.

Chelicera - Movable digit 28 long, apparently with 1 tooth; fixed digit 30 long, with 3 clearly visible teeth and a *pilus dentilis*, more teeth may be present, but the position of the digits render a more precise determination impossible.

Spermatheca - Calyx trumpet-shaped, 24 long; atrium forked.

Legs - Macroseta sharp-tipped; St IV 44. Chaetotaxy: genu II: 2-2/0,2/0- 1; genu III: 1-2/1,2/0-1.

SPECIMENS EXAMINED - One female, **South Africa**: 7 km from Pearston to Somerset-East, Eastern Cape Province, from *Chenopodium* sp., 6-II-1974, L. C. Smit.

REMARKS - This is the first report of this species in Africa.

DISTRIBUTION - Czech Republic, France, Germany, Hungary, Kazakhstan, Moldova, Netherlands, Russia, South Africa, Switzerland, Turkey, Ukraine, and USA.

***Neoseiulus angolaensis* Ueckermann, Moraes and Zannou n. sp. (Fig. 3)**

DIAGNOSIS - This species is distinct by having the junction of atrium and major duct vacuolate, genu II bearing 9 setae, peritreme extending to level of j1 and setae r3 much longer than R1.

FEMALE - One specimen measured.

Dorsum - Dorsal shield 328 long, 186 wide, mostly smooth, with few anterolateral striae. Setae j1 22, j3 41, j4 28, j5 22, j6 28, J2 30, J5 9, z2 38, z4 47, z5 28, Z1 41, Z4

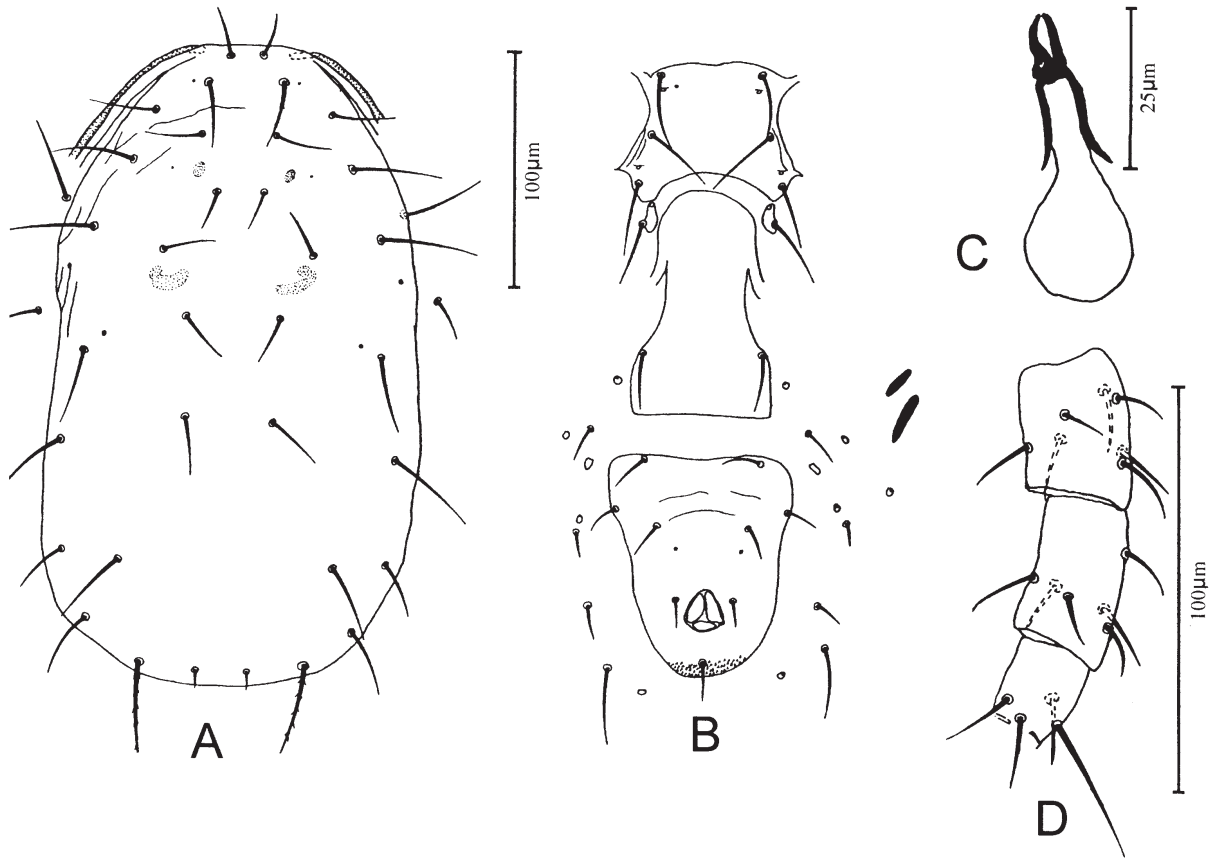


Fig. 3. *Neoseiulus angolaensis* Ueckermann, Moraes and Zannou **n. sp.** (female) - A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Leg IV.

44, Z5 57, s4 55, S2 47, S4 32, S5 35, r3 44, R1 28. All setae smooth except Z5, serrate.

Peritreme - Extending almost to level of j1.

Venter - Sternal shield smooth, posterior margin concave; distances between St1-St3 57, St2-St2 60. Genital shield smooth; distance between St5-St5 62. Ventrianal shield subtriangular, with few striae anterior to Jv2, anterior margin concave, 120 long and 99 wide at level of Zv2 and 79 at level of anus, with a pair of widely spaced round preanal pores posteromesad to Jv2. Two pairs of metapodal shields. Caudoventral setae smooth and sharp-tipped.

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

Spermatheca - Calyx saccular, 20 long; junction of atrium and major duct vacuolate.

Legs - Macroseta pointed distally; St IV 41. Chaetotaxy: genu II: 2-2/1,2/1- 1; Sge III: 1-2/1,2/0-1.

LOCALITY AND TYPE MATERIAL - Holotype female, from *Vernonia* sp., Chianga, Huambo Province, **Angola**, 14-IV-1972, M. K. P. Smith Meyer, deposited in NCA-PPRI.

ETYMOLOGY - The epithet *angolaensis* refers to the country where the type of this new species was collected.

REMARKS - The saccular calyx of spermatheca, junction of atrium and major duct vacuolate, triangular ventrianal shield with widely spaced preanal pores and number of teeth on cheliceral digit relates this species to *N. hamus* (Karg). However, *N. angolaensis* differs from *N. hamus* in that genu II bears 9 setae, instead of 7 in *N. hamus* and in that r3 is much longer than R1, instead of subequal in length in *N. hamus*.

DISTRIBUTION - Angola.

***Neoseiulus asperisetatus* Zannou, Moraes and Oliveira **n. sp.** (Fig. 4)**

DIAGNOSIS - This species is distinct by having, S4, S5 and Jv5 serrate and spermathecal calyx disc-shaped.

FEMALE - Seven specimens measured.

Dorsum - Dorsal shield 391(376-408) long, 198 (179-210) wide, reticulate. Setae j1 25(22-26), j3 28(24-29), j4 16(14-17), j5 15(14-17), j6 19(16-21), J2 21(19-22), J5 11(7-14), z2 22(21-26), z4 24(21-26), z5 16(14-

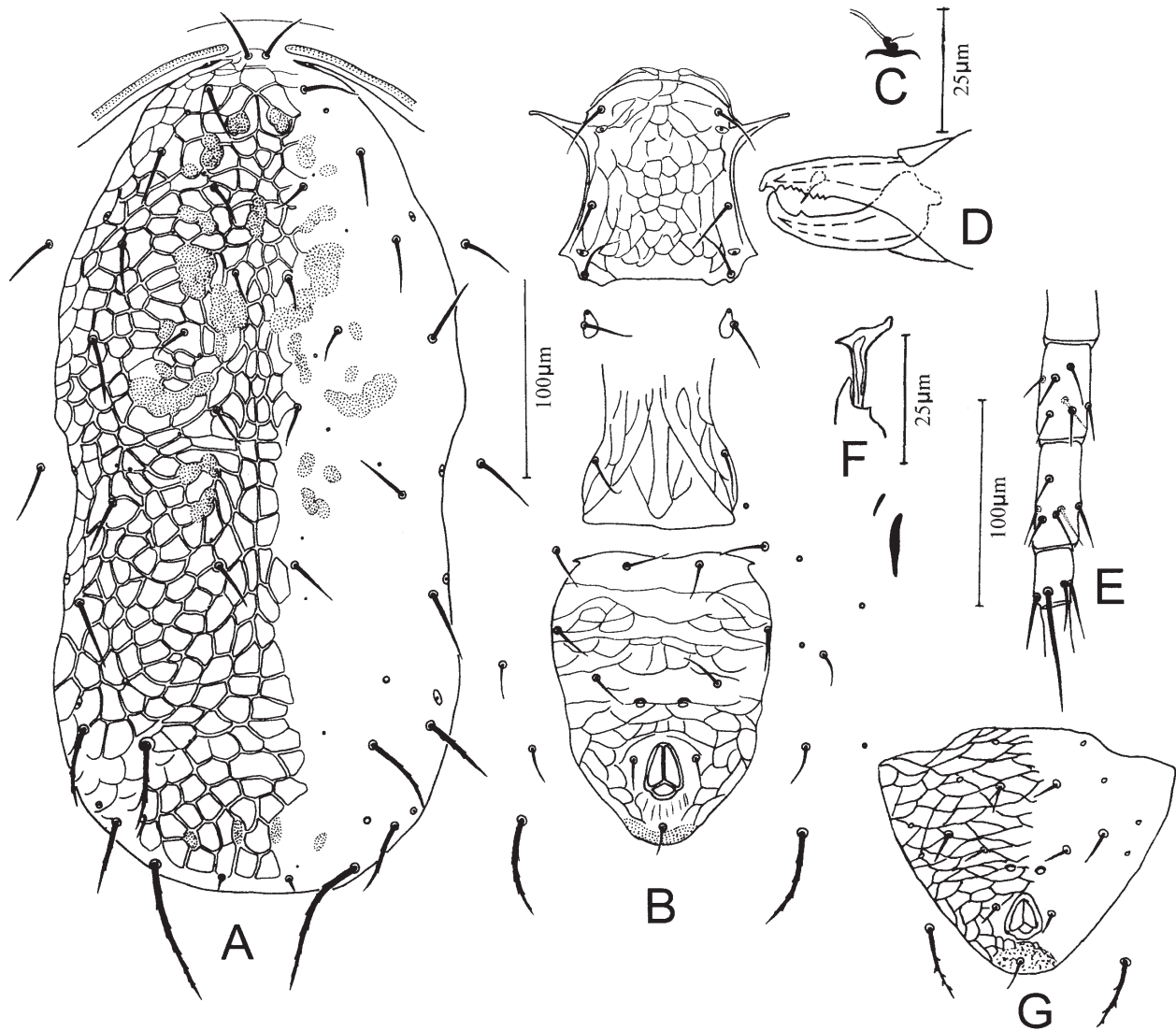


Fig. 4. *Neoseiulus asperisetatus* Zannou, Moraes and Oliveira n. sp. - A. Female dorsal shield; B. Female ventral surface; C. Spermatheca; D. Female chelicera, E. Female leg IV; F. Spermatodactyl; G. Male ventrianal shield.

17), Z1 23(21-24), Z4 40(38-40), Z5 68(59-75), s4 29(26-32), S2 31(28-34), S4 35(32-38), S5 35(32-38), r3 24(21-26), R1 25(24-29). Setae Z4, Z5, S4 and S5 serrate, remaining setae smooth.

Peritreme - Extending almost to level of j1.

Venter - Sternal shield reticulate, posterior margin slightly concave; distances between St1-St3 77(72-83), St2-St2 64(62-67). Genital shield longitudinally striate; distance between St5-St5 68(61-74). Ventrianal shield pentagonal, reticulate, anterior margin slightly concave, 138(133-144) long, 107(101-111) wide at level of Zv2 and 85(77-93) wide at level of anus, with a pair of elliptical pores posteromesad to Jv2. Two pairs of metapodal shields. Caudoventral setae smooth and sharp-tipped, except Jv5, serrate.

Chelicera - Movable digit 35(33-35) long, with 1 tooth; fixed digit 32(31-33) long, with 8 teeth and a distinguishable *pilus dentilis*.

Spermatheca - Calyx disc-shaped, 5(3-6) long, 12(11-14) in diameter, atrium nodular.

Legs - Macroseta sharp-tipped; St IV 52(45-60).

Chaetotaxy: genu II: 2-2/0, 2/0-1; genu III: 1-2/1,2/0-1.

MALE - One specimen measured.

Dorsum - Dorsal shield 308 long, 173 wide, shield pattern as in female. Setae j1 21, j3 22, j4 15, j5 15, j6 17, J2 20, J5 12, z2 20, z4 20, z5 15, Z1 20, Z4 43, Z5 52, s4 24, S2 29, S4 33, S5 32, r3 23, R1 24. Setae Z4, Z5, S4 and S5 serrate, remaining setae smooth.

Peritreme - Extending to level between j1 and j3.

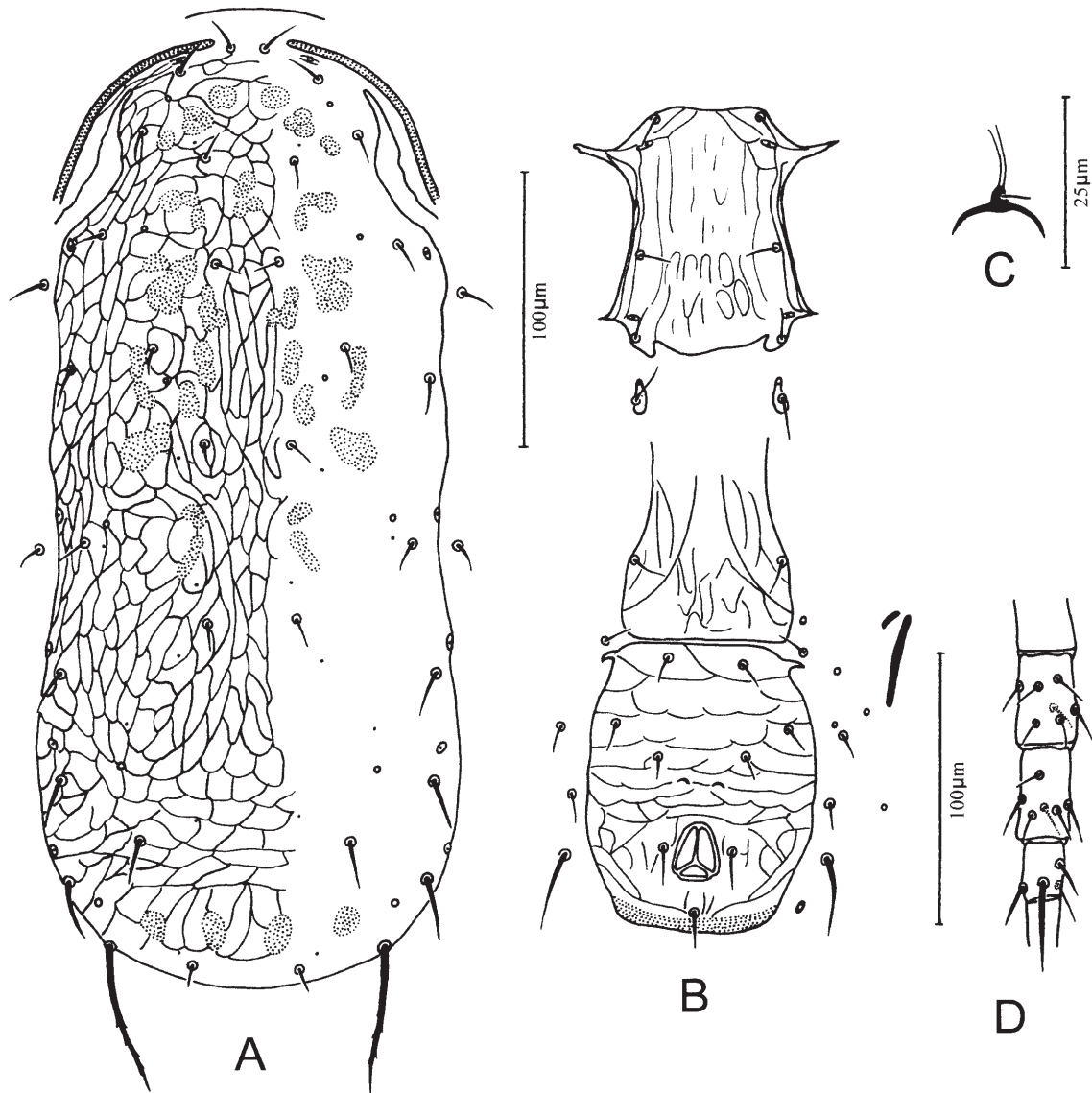


Fig. 5. *Neoseiulus baraki* (Athias-Henriot) (female) - A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Leg IV.

Venter - Ventrianal shield subtriangular, reticulate; 120 long, 143 wide at the anterior corners; with 3 pairs of preanal setae, 4 pairs of lyrifissures (1 anterior to Jv1, 1 lateral and almost in line with Jv1, 1 lateral and well posterior to Jv1 and 1 lateral and slightly posterior to Zv2) and a pair of elliptical pores posteromesad to Jv2. Seta Jv5 serrate.

Spermatodactyl - T-shaped, shaft 15 long.

Legs - Macroseta sharp-tipped, St IV 47. Chaetotaxy of genua II and III same as in female.

LOCALITY AND TYPE MATERIAL - Holotype female, from an unknown plant, Tamarou, Atacora Province, **Benin**, 22-XI-1989, G.J. de Moraes, deposited at ESALQ-USP; 1 paratype female from *Manihot esculenta*, 16 km N Natitingou, Atacora Province, **Benin**, 20-XI-

1989, A. Onzo, deposited at ESALQ-USP; 1 paratype female from *Pennisetum pedicellatum*, Atcherigbe-Gare, Zou Province, **Benin**, 29-X-1991, S. Dossou, deposited at IITAIM; 1 paratype female from *Andropogon gayanus*, 1 km SW Nkoteng, **Cameroon**, 05-II-1991, A. Onzo deposited at ESALQ-USP; 1 paratype female from *Hyparrhenia* sp., 3 km N Masi- Manimba, **Democratic Republic of Congo**, 26-VI- 1991, A. Onzo, deposited at ESALQ-USP; 4 paratype females and 1 allotype male from *A. gayanus*, 34 km E Matadi, Bas-Congo, **Democratic Republic of Congo**, 11-VII- 1991, A. Onzo, deposited at ESALQ- USP; 1 paratype female from *Bambusa* sp., Luapula Research Station, **Zambia**, 27-V-1993, S. Kunda deposited at IITAIM.

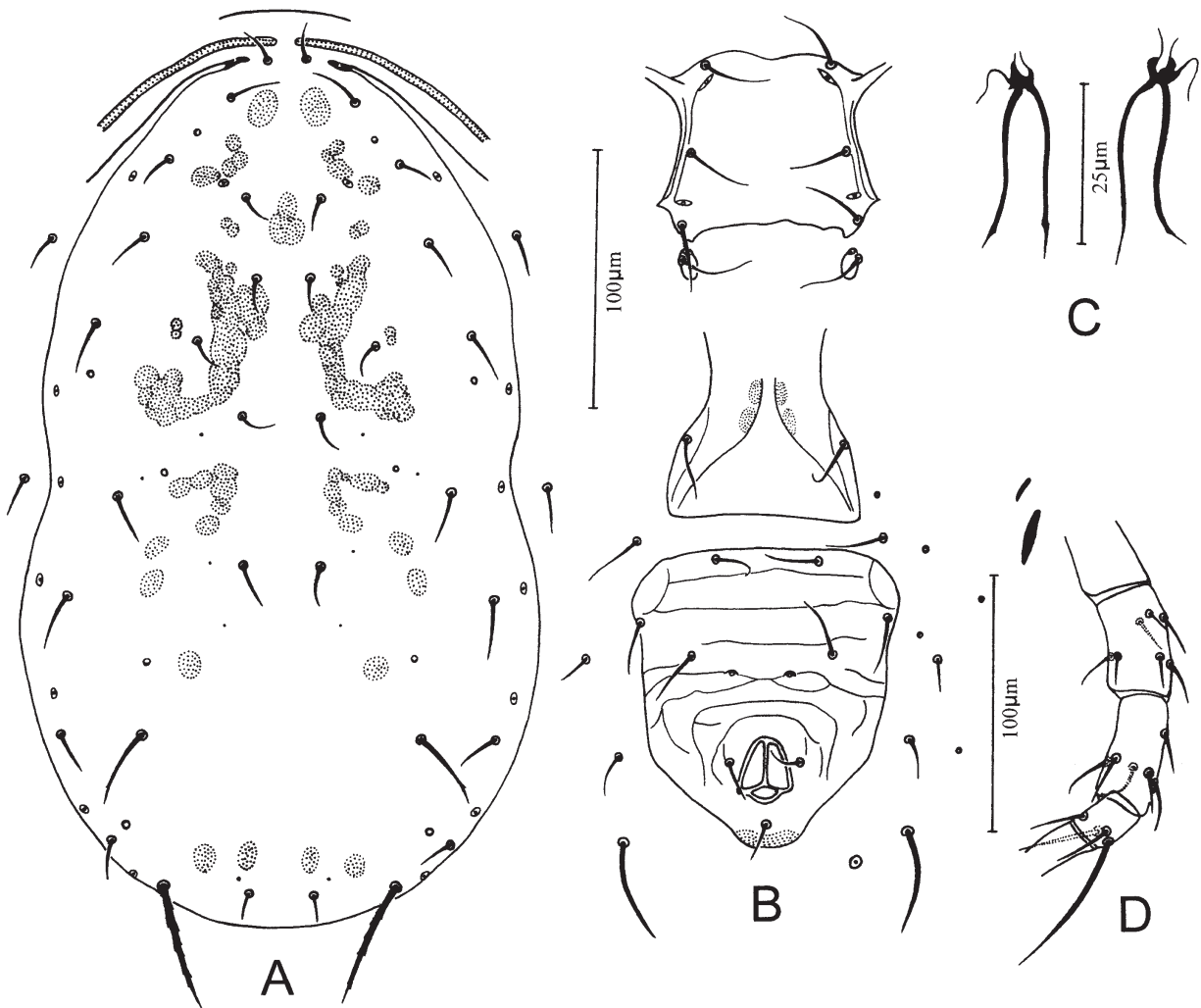


Fig. 6. *Neoseiulus barkeri* Hughes (female) - A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Leg IV.

ETYMOLOGY - The epithet *asperisetatus* refers to the serration of S4, S5 and Jv5 of this new species.

REMARKS - *Neoseiulus baraki* (Athias-Henriot, 1966) is similar to the new species but differs by having S4, S5 and Jv5 smooth and preanal pores widely spaced. *Neoseiulus coatesi* (Schultz, 1972) also resembles this new species, but has widely spaced preanal pores, calyx of spermatheca bell-shaped and 2 and 13 teeth on movable and fixed cheliceral digits, respectively.

DISTRIBUTION - Benin, Cameroon, Democratic Republic of Congo, and Zambia.

***Neoseiulus baraki* (Athias-Henriot)
(Fig. 5)**

Amblyseius baraki Athias-Henriot, 1966: 211.

Amblyseius (Amblyseius) baraki, Ehara and Bhandhufalck, 1977: 54.

Amblyseius (Neoseiulus) baraki, Gupta, 1986: 104.

Neoseiulus baraki, Chant and McMurtry, 2003: 27; Moraes *et al.*, 2004: 104.

Amblyseius dhooriai (Gupta, 1977): 30 (synonymy according to Gupta, 1986).

FEMALE - Seven specimens measured (Benin: 4; Burundi: 1; Kenya: 2).

Dorsum - Dorsal shield 353(336-365) long, 157(142-168) wide, strongly reticulate. Setae j1 15(10-19), j3 15(13-18), j4 9(8-10), j5 10(8-11), j6 11(8-14), J2 13(11-14), J5 10(8-11), z2 11(6-16), z4 13(11-16), z5 9(8-10), Z1 13(11-16), Z4 18(11-24), Z5 61(53-67), s4 14(13-18), S2 16(11-21), S4 20(16-29), S5 25(19-30), r3 15(11-18), R1 12(11-14). All setae smooth, except Z5, serrate.

Peritreme - Extending to level of j1.

Venter - Sternal shield striate, posterior margin slightly convex; distances between St1-St3 80(75-85), St2-St2 54(51-59). Genital shield striate; distance between St5-St5 59(56-62). Ventrianal shield quadrate, re-

ticulate, anterior margin straight, 117(107-125) long, 87(82-93) wide at level of Zv2 and 86(77-99) wide at level of anus, with a pair of elliptical pores posteromesad to Jv2. Two pairs of metapodal shields. Caudoventral setae smooth and sharp-tipped.

Chelicera - Movable digit 21(21-22) long, with 1 tooth; fixed digit 25(25-26) long, with 7 teeth and a *pilus dentilis*.

Spermatheca - Calyx disc-shaped, 3 long and 12(11-12) in diameter; atrium nodular.

Legs - Macroseta sharp-tipped; St IV 34(29-40). Chaetotaxy: genu II: 2-2/0,2/0-1; genu III: 1-2/1,2/0-1.

SPECIMENS EXAMINED - Eight females, **Benin**: Gamia, Atacora Province, on unknown plant, 22-XI-1989, G.J. Moraes; Glazoue, Zou Province, on *Andropogon gayanus*, 10-VI-1991, A. Onzo; Bethel, Atacora Province, on unknown plant, 23-X-1991, B. Eklou; Atcherigbe-Gare, Zou Province, on *Pennisetum pedicellatum*, 29-X-1991, S. Dossou; Djougou, Atacora Province, on unknown plant, 20-XI-1991, B. Eklou. Two females, **Burundi**: 3 km N Minago, on *Setaria* sp., 14-XII-1989, J.S. Yaninek. Four females, **Kenya**: 19 km S Kisumu, Nyanza Province, on *Lantana camara*, 03-XII-1989, J.S. Yaninek; 39 km W Nakuru, Valley Province, on unknown plant, 04-XII-1989, J.S. Yaninek.

REMARKS - This is the first report of this species from sub-Saharan Africa.

DISTRIBUTION - Algeria, Benin, Burundi, China, India, Kenya, Thailand, and Taiwan.

Neoseiulus barkeri Hughes (Fig. 6)

Neoseiulus barkeri Hughes, 1948: 141; Chant and McMurtry, 2003: 35; Moraes *et al.*, 2004: 104.

Amblyseius barkeri, Athias-Henriot, 1961: 440; Moraes *et al.*, 1989a: 95.

Amblyseius (Amblyseius) barkeri, Van der Merwe, 1968: 112.

Neoseiulus bakeri [sic], Ryu *et al.*, 2001: 8.

Typhlodromus barkeri, Hirschmann, 1962: 9.

Typhlodromus (Amblyseius) barkeri, Hughes, 1961: 222.

Typhlodromus (Neoseiulus) barkeri, Nesbitt, 1951: 35.

Typhlodromus (Typhlodromus) barkeri, Chant, 1959: 63.

Amblyseius masiaka Blommers and Chazeau, 1974: 308. (synonymy according to Ueckermann and Loots, 1988).

Amblyseius mckenziei Schuster and Pritchard, 1963: 268 (synonymy according to Ragusa and Athias-Henriot, 1983).

Amblyseius mycophilus Karg, 1970: 290 (synonymy according to Ragusa and Athias-Henriot, 1983).

Amblyseius oahuensis Prasad, 1968: 1518 (synonymy according to Ragusa and Athias-Henriot, 1983).

Amblyseius picketti Specht, 1968: 681 (synonymy according to Ragusa and Athias-Henriot, 1983).

Amblyseius (Amblyseius) usitatus Van der Merwe, 1965: 71 (synonymy according to Ueckermann and Loots, 1988).

FEMALE - Eight specimens measured (Benin: 2; Burundi: 1; Ghana: 1; Kenya: 2; Nigeria: 1; Mozambique: 1).

Dorsum - Dorsal shield 340(328-360) long, 185 (173-203) wide, smooth. Setae j1 16(14-17), j3 19(18-21), j4 15(13-16), j5 15(13-16), j6 16(13-18), J2 19(16-22), J5 10(10-11), z2 18(18-21), z4 17(16-19), z5 16(13-18), Z1 19(18-21), Z4 33(29-38), Z5 51(46-56), s4 20(18-22), S2 20(19-24), S4 20(18-22), S5 17(16-19), r3 18(16-19), R1 16(14-16). All setae smooth, except Z4 and Z5, serrate.

Peritreme - Extending beyond base of j1.

Venter - Sternal shield with scarce lateral striae, posterior margin concave; distances between St1-St3 63(61-65), St2-St2 63(61-67). Genital shield with scarce lateral striae; distance between St5-St5 60(56-63). Ventrianal shield pentagonal, striate, anterior margin slightly convex, 114(109-120) long, 102(96-107) wide at level of Zv2 and 81(78-83) wide at level of anus, with a pair of elliptical pores mesad and slightly posterior to Jv2. Two pairs of metapodal shields. Caudoventral setae smooth and sharp-tipped.

Chelicera - Movable digit 33(32-33) long, with 1 tooth; fixed digit 30(29-31) long, with 5 teeth and a *pilus dentilis*.

Spermatheca - Calyx saccular, 21(19-24) long; atrium forked.

Legs - Macroseta sharp-tipped; St IV 63(58-69). Chaetotaxy: genu II: 2-2/0,2/0-1; genu III: 1-2/1,2/0-1.

SPECIMENS EXAMINED - Four females, **Benin**: Gamia, on unknown plant, 22-XI-1989, G.J. Moraes; 3 km S Kandi, on *Capsicum* sp., 22-XI-1989, G.J. Moraes. Two females, **Burundi**: ISABU, Bujumbura, on unknown plant, 11-XII-1989, J.S. Yaninek. Two females, **Ghana**: 1 km SE Tsito, Volta Region, on *Commelina benghalensis*, 19-IV-1990, K. Gyambi. Three females, **Kenya**: 6.5 km S Mombasa, Coastal Province, on *Sida acuta*, 28-XI-1989, J.S. Yaninek; 14 km W Kwale, Coastal Province, on *Synedrella nodiflora*, 29-XI-1989, J.S. Yaninek. One female, **Mozambique**: 2 km N Muecate, Nampula Province, on *Tridax procumbens*, 30-IV-2001, I.D. Zannou. Two females, **Nigeria**: 2 km N Adim, unknown plant, 17-IV-1992, A. Onzo.

REMARKS - Ragusa and Athias-Henriot (1983) suspected *Neoseiulus* (= *Amblyseius*) *cydnodactylon* (Shehata and Zaher) and *Neoseiulus* (= *Amblyseius*) *sugonjaevi* (Wainstein and Abbasova) to be junior synonyms of *N. barkeri*. Ueckermann and Loots (1988) also suspected *Neoseiulus* (= *Amblyseius*) *pieteri* (Schultz) to be a junior synonym of *N. barkeri*. Nesbitt (1951) suspected *Neoseiulus* (= *Lasioseius*) *polonicus* (Willmann) to be a junior synonym of this species, but Chant (1959) and

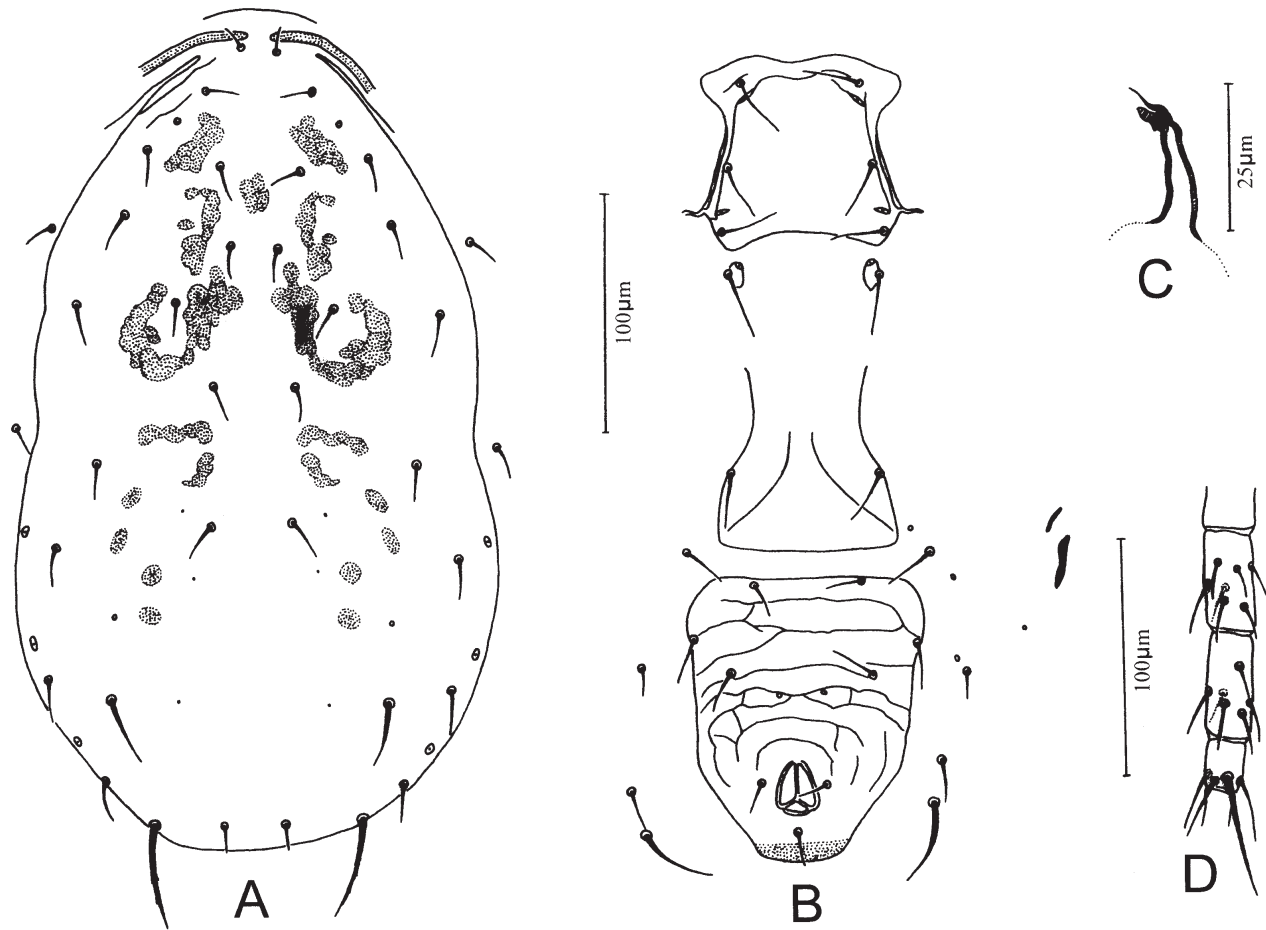


Fig. 7. *Neoseiulus calorai* (Corpuz-Raros and Rimando) (female) - A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Leg IV.

Ragusa and Athias-Henriot (1983) considered them as different species.

Neoseiulus barkeri and *Neoseiulus erugatus* Ragusa and Athias-Henriot are very similar and may be synonyms. The synonymy between the two species is not officially proposed here because we did not examine their respective holotypes in this study.

DISTRIBUTION - Algeria, Australia, Benin, Burundi, Brazil, Canary Island, Cape Verde, China, England, Finland, France, Georgia, Germany, Ghana, Greece, Guinea, Hawaii, India, Israel, Italy, Ivory Coast, Japan, Jordan, Kenya, Madagascar, Mozambique, Netherlands, Nigeria, Norway, Reunion Island, Russia, South Africa, South Korea, Spain, Sweden, Tahiti, Taiwan, Turkey, Ukraine, USA, and Yemen.

Neoseiulus benjamini (Schicha)

Amblyseius benjamini Schicha, 1981: 203.

Amblyseius (*Amblyseius*) *benjamini*, Ueckermann and Loots, 1988: 142.

Neoseiulus benjamini, Chant and McMurtry, 2003: 27; Moraes *et al.*, 2004: 108.

REMARKS - This species was reported for the first time in South Africa by Ueckermann and Loots (1988). No additional specimens were collected in this study.

DISTRIBUTION - Australia, and South Africa.

Neoseiulus calorai (Corpuz-Raros and Rimando) (Fig. 7)

Amblyseius calorai Corpuz-Raros and Rimando, 1966: 132.

Neoseiulus calorai, Chant and McMurtry, 2003: 35; Moraes *et al.*, 2004: 111.

Cydnodromus ghanii Muma, 1967: 274 (synonymy according to Abbasova, 1972).

FEMALE - Two specimens measured (Kenya: 2).

Dorsum - Dorsal shield 324(320-328) long, 165 (160-170) wide, mostly smooth, with a few anterolateral striae. Setae j1 11, j3 16, j4 13, j5 15(14-15), j6 14, J2

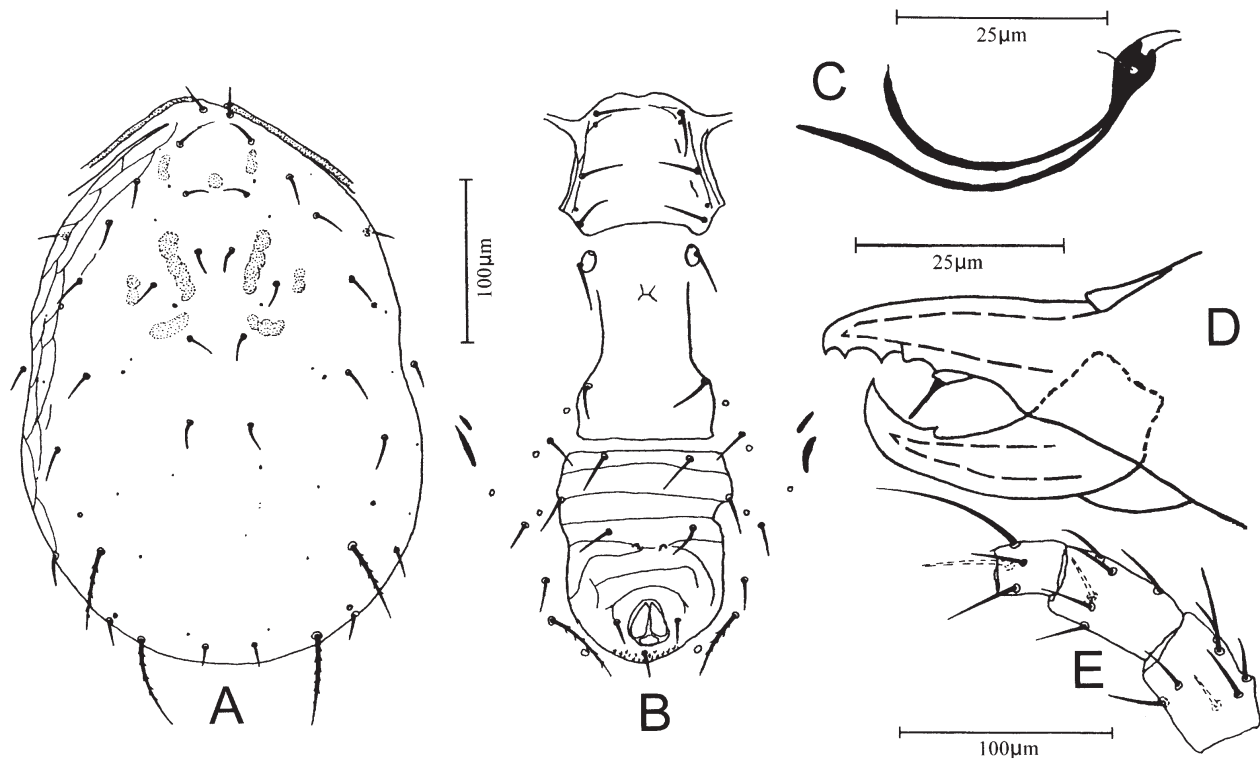


Fig. 8. *Neoseiulus ceratoni* (Ueckermann and Loots) (female) - A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Chelicera, E. Leg IV.

16(15-18), J5 10(10-11), z2 15(14-15), z4 15(14-16), z5 15(14-15), Z1 17(17-18), Z4 26, Z5 36(34-38), s4 18, S2 18, S4 16, S5 15(14-15), r3 15(14-15), R1 13(13-14). All setae smooth, except Z5, lightly serrate.

Peritreme - Extending beyond base of j1.

Venter - Sternal shield with scarce lateral striae, posterior margin concave; distances between St1-St3 62(61-62), St2-St2 61(60-62). Genital shield smooth; distance between St5-St5 61(59-62). Ventrianal shield pentagonal, striate, anterior margin straight, 113(112-114) long, 100(100-101) wide at level of Zv2 and 83(80-86) wide at level of anus, with a pair of round pores mesad and slightly posterior to Jv2. Two pairs of metapodal shields. Caudoventral setae smooth and sharp-tipped.

Chelicera - Movable digit 33(32-34) long, with 1 tooth; fixed digit 31(30-32) long, apparently with 3 or 4 teeth and a distinguishable *pilus dentilis*.

Spermatheca - Calyx trumpet-shaped, 15(13-17) long; atrium forked.

Legs - Macroseta sharp-tipped; St IV 49(48-49).

Chaetotaxy: genu II: 2-2/0,2/0-1; genu III: 1-2/1,2/0-1.

SPECIMENS EXAMINED - Two females, **Kenya**: Lungalunga, Vanga, Kwale District, from *Abutilon* sp., 07-III-1990, J.S. Yaninek.

REMARKS - This is the first record of this species in Africa.

DISTRIBUTION - Azerbaijan, Kenya, and Philippines.

Neoseiulus ceratoni (Ueckermann and Loots)
(Fig. 8)

Amblyseius (*Amblyseius*) *ceratoni* Ueckermann and Loots, 1988: 133.

Neoseiulus ceratoni, Chant and McMurtry, 2003: 23; Moraes *et al.*, 2004: 112.

FEMALE - Four specimens measured (Zimbabwe: 4).

Dorsum - Dorsal shield 336(318-353) long, 206 (187-214) wide, mostly smooth, with a few lateral striae. Setae j1 15(13-16), j3 19, j4 15(13-16), j5 16, j6 16, J2 19, J5 13, z2 19, z4 19, z5 16, Z1 18(16-19), Z4 48(46-50), Z5 55(52-57), s4 22(19-25), S2 21(19-22), S4 19, S5 16, r3 18(16-19), R1 16. All setae smooth, except Z4 and Z5, serrate.

Peritreme - Extending anterior to base of j1.

Venter - Sternal shield smooth, posterior margin concave; distances between St1-St3 56(55-57), St2-St2 59(57-60). Genital shield smooth; distance between St5-St5 62(60-63). Ventrianal shield pentagonal with parallel striae, anterior margin straight, 118(104-126) long, 96(88-101) wide at level of Zv2 and 83(79-88) at level of

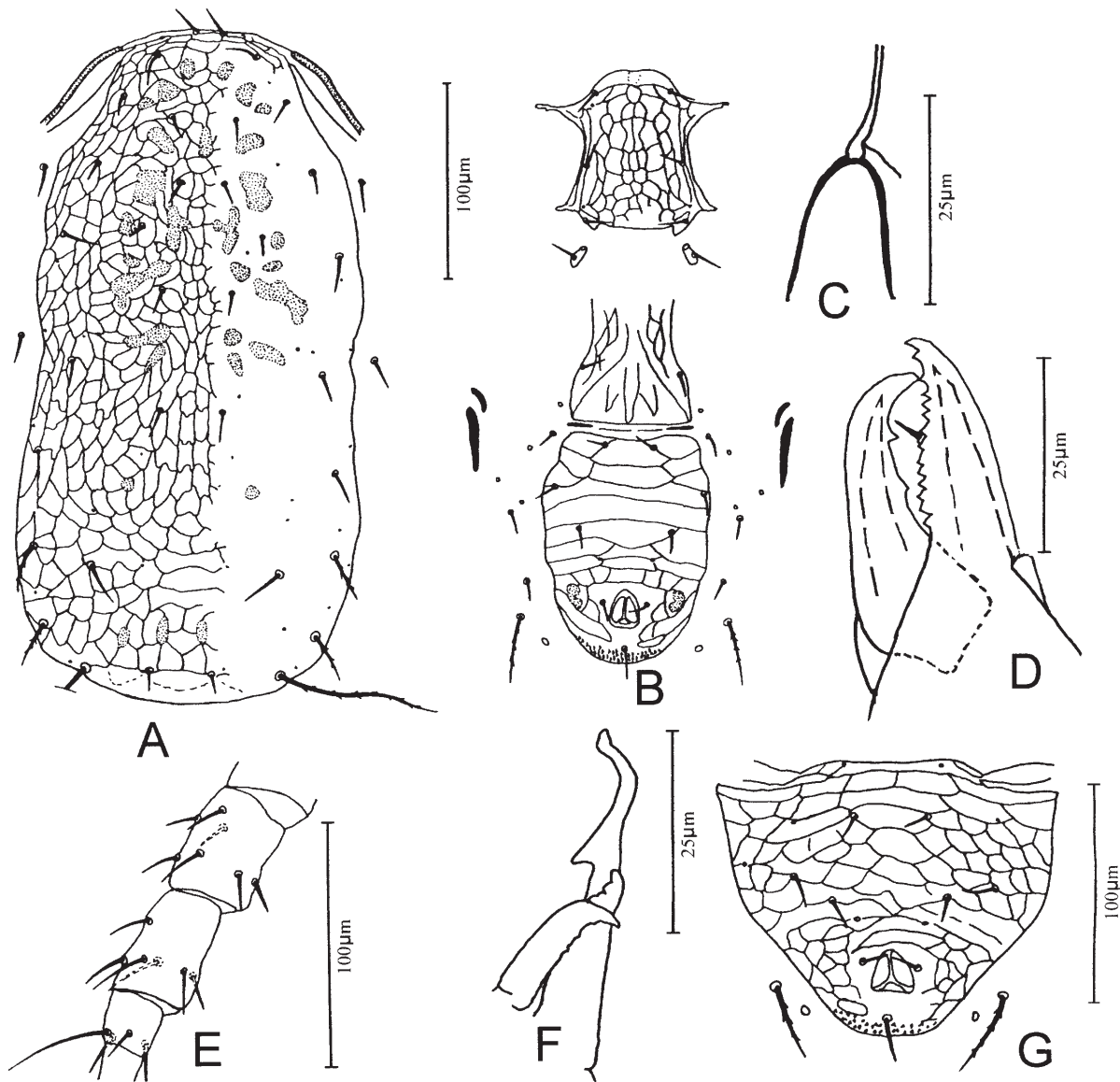


Fig. 9. *Neoseiulus coatesi* (Schutz) - A. Female dorsal shield; B. Female ventral surface; C. Spermatheca; D. Female chelicera, E. Female leg IV; F. Spermatodactyl; G. Male ventrianal shield.

anus, with a pair of closely associated elliptical preanal pores posteromesad to Jv2. Two pairs of metapodal shields. Caudoventral setae smooth and sharp-tipped, except Jv5, serrate.

Chelicera - Movable digit 32 long, with 1 tooth; fixed digit 28 long, with 4 teeth and a *pilus dentilis*.

Spermatheca - Calyx trumpet-shaped, 37(35-38) long; atrium nodular but slightly forked.

Legs - Macrosetae pointed distally; Sge IV 30 (26-32), St IV 47(44-50). Chaetotaxy: genu II: 2-2/0,2/0-1; genu III 1-2/1,2/0-1.

SPECIMENS EXAMINED - Four females, **Zimbabwe**: 32 km from Shamva, from *Combretum molle*, 19-III-1969, M.K.P. Smith Meyer; 10 km from Umvuma, from *Crotalaria anthyllopsis*, 24-III-1969, W. J. Dun-

combe; Banket, from *Crotalaria macrocarpa*, 20-III-1969, W.J. Duncombe.

DISTRIBUTION - Zimbabwe.

Neoseiulus coatesi (Schultz)
(Fig. 9)

Amblyseius (*Amblyseius*) *coatesi* Schultz, 1972: 13.

Amblyseius (*Amblyseius*) *coatesi*, Ueckermann and Loots, 1988: 130.

Neoseiulus coatesi, Chant and McMurtry, 2003: 27; Moraes *et al.*, 2004: 113.

FEMALE - Nine specimens measured (South Africa: 9).

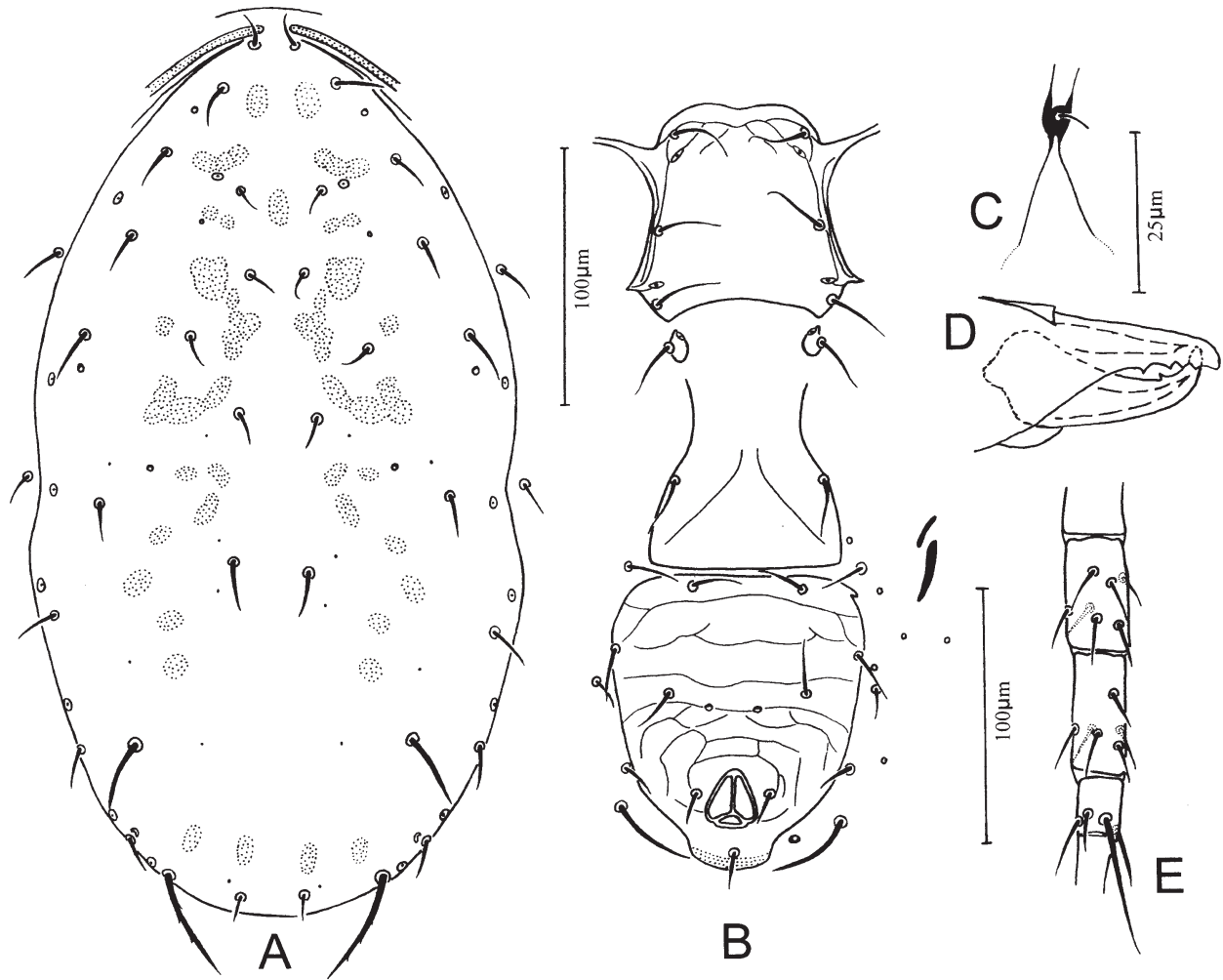


Fig. 10. *Neoseiulus conicus* Zannou, Moraes and Oliveira **n. sp.** (female) - A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Chelicera; E. Leg IV.

Dorsum - Dorsal shield 373(347-406) long, 176 (164-211) wide, reticulate. Setae j1 18(16-21), j3 21(19-22), j4 11(9-13), j5 11(9-13), j6 15(13-16), J2 15(13-16), J5 15(11-22), z2 15(13-17), z4 14(13-16), z5 11(9-13), Z1 16(13-19), Z4 26(25-32), Z5 106(95-121), s4 22(19-23), S2 21(17-25), S4 34(26-38), S5 32(25-41), r3 21 (17-25), R1 20(16-25). Setae S4, S5, Z5 and in some specimens also J5 serrate; other setae smooth.

Peritreme - Extending to level between j1 and j3.

Venter - Sternal shield reticulate, posterior margin convex; distances between St1-St3 77(72-82), St2-St2 56(50-63). Genital shield reticulate; distance between St5-St5 60(50-68). Ventrianal shield pentagonal, reticulate, anterior margin concave, 131(120-139) long and 100(95-113) wide at level of Zv2 and 86(82-95) at level of anus, with a pair of small and round preanal pores posteromesad to Jv2. Two pairs of metapodal shields. Caudoventral setae smooth and sharp-tipped, except Jv5, serrate.

Chelicera - Movable digit 35(32-39) long, with 2 rather widely separated teeth; fixed digit 30(25-32) long, with 13 teeth and a *pilus dentilis*.

Spermatheca - Calyx bell-shaped 13 long; atrium small and nodular.

Legs - Macrosetae sharp-tipped in some species, but with small knobs in others; Sge IV 24(22-25), Sti IV 33(30-35), St IV 47(38-59). Chaetotaxy: genu II: 2-2/1, 2/0- 1; genu III: 1-2/1, 2/0-1.

MALE - One specimen measured (South Africa: 1).

Dorsum - Dorsal shield 309 long, 192 wide, shield pattern as in female. Setae j1 16, j3 19, j4 9, j5 9, j6 13, J2 13, J5 16, z2 16, z4 13, z5 9, Z1 16, Z4 25, Z5 82, s4 19, S2 22, S4 28, S5 28, r3 19, R1 19. Setae S4, S5, Z5 and J5 serrate, others smooth.

Peritreme - Extending to level of j3.

Venter - Ventrianal shield subtriangular, reticulate; 120 long and 145 wide at anterior corners; with 3 pairs of preanal setae, a pair of small preanal pores posteromesad

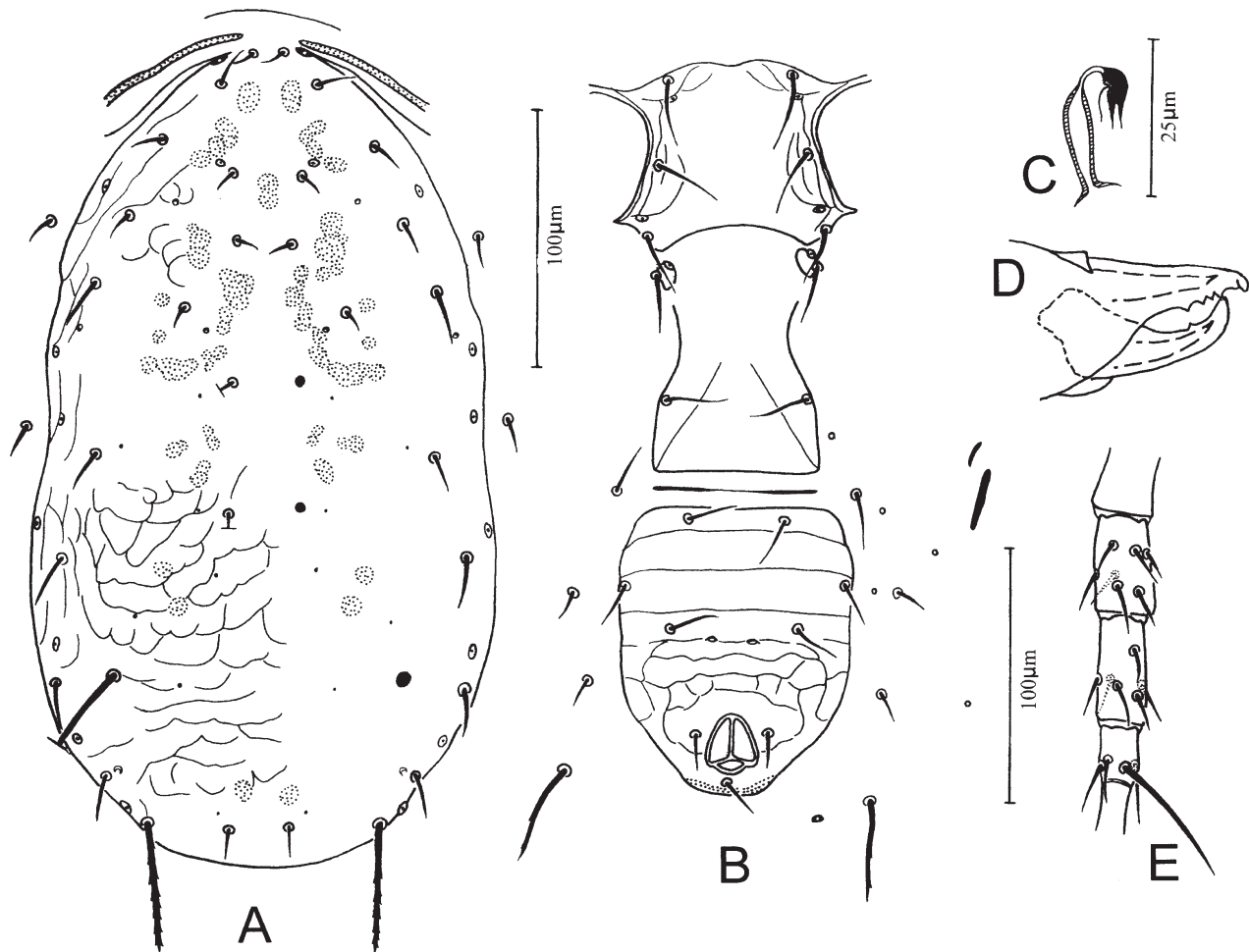


Fig. 11. *Neoseiulus constricticervix* Zannou, Moraes and Oliveira *n. sp.* (female) - A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Chelicera; E. Leg IV.

to Jv2, and 3 pairs of small and round lyrifissures anterior to Jv1 and lateral to Jv1 and Zv2.

Spermatodactyl - Shaft 19 long.

Legs - Macrosetae pointed distally; Sge IV 19, Sti IV 28, St IV 44. Chaetotaxy of genua II and III same as in female.

SPECIMENS EXAMINED - Eleven females and one male, **South Africa**: George, Western Cape Province, from *Trimeria rotundifolia*, 23-I-1965, M.K.P. Smith Meyer; Tzitzikama National Park, Eastern Cape Province, from grass, 18-I-1965, M.K.P. Smith Meyer; Bathurst, Eastern Cape Province, from *Ananas comosus*, VI-1968, D.S. Le Grice; 5 km from Port Alfred to East London, Eastern Cape Province, from *Helichrysum cymosum*, 7-XII-1977, M.K.P. Smith Meyer; The Bluff, Durban, Kwazulu, Natal Province, from *Panicum maximum*, 12- XII-1978, E.A. Ueckermann; Richtershoek, Mpumalanga Province, from grass, 28-V-1979, M.K.P. Smith Meyer; Golden Gate National Park, Free State Province, from grass, 9-II-1982, E.A. Ueckermann.

REMARKS - The holotype has only one macroseta (St IV) sharp-tipped. Some paratypes have 3 macrosetae (Sge IV, Sti IV and St IV) with small knobs; others only bear 2 macrosetae (Sti IV and St IV), sharp-tipped.

DISTRIBUTION - South Africa.

***Neoseiulus conicus* Zannou, Moraes and Oliveira
n. sp. (Fig. 10)**

DIAGNOSIS - This species is characterized by the combination of the following characters: dorsal shield smooth, peritreme long extending beyond base of j1 and cone-shaped calyx of spermatheca.

FEMALE - One specimen measured.

Dorsum - Dorsal shield 340 long, 187 wide, smooth. Setae j1 16, j3 19, j4 12, j5 13, j6 14, J2 19, J5 10, z2 17, z4 16, z5 13, Z1 15, Z4 30, Z5 46, s4 22, S2 18, S4 17, S5 14, r3 16, R1 15. All setae smooth, except Z5, serrate.

Peritreme - Extending beyond base of j1.

Venter - Sternal shield smooth, posterior margin concave; distances between St1-St3 64, St2-St3 64. Geni-

tal shield smooth; distance between St5-St5 59. Ventrianal shield pentagonal, reticulate, anterior margin slightly convex, 115 long, 99 wide at level of Zv2 and 90 wide at level of anus, with a pair of elliptical pores mesad and slightly posterior to Jv2. Two pairs of metapodal shields. Caudovernal setae smooth and sharp-tipped.

Chelicera - Movable digit 31 long, with 1 tooth; fixed digit 30 long, with 4 teeth and a *pilus dentilis*.

Spermatheca - Calyx cone-shaped, 20 long; atrium forked.

Legs - Sharp-tipped macroseta; St IV 54. 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 *Grewia bicolor*, 40 km E Jos, **Nigeria**, 26-V-1992, B. Kristensen, deposited at ESALQ-USP.

ETYMOLOGY - The epithet *coniculus* refers to the shape of the calyx of the spermatheca of this new species.

REMARKS - *Neoseiulus foramenis* (Karg, 1970) resembles the new species, but has longer S2, S4 and S5, shorter peritreme (extending to level between j1 and j3) and a single pair of metapodal shields. This new species is also similar to *Neoseiulus zwoelferi* (Dosse, 1957), but the latter is larger and has a reticulate dorsal shield, narrower ventrianal shield and macrosetae on genu IV and tarsus IV.

DISTRIBUTION - Nigeria.

***Neoseiulus constricticervix* Zannou, Moraes and Oliveira n. sp. (Fig. 11)**

DIAGNOSIS - This species is characterized by the combination of the following characters: dorsal shield with anterior half smooth centrally and with diagonal striae laterally, s4 shorter than the distance between its base and the bases of z4 and z5, respectively, ca. 1/4 of spermathecal calyx constricted near atrium and atrium forked.

FEMALE - One specimen measured.

Dorsum - Dorsal shield 314 long, 170 wide, with anterior half smooth centrally and with diagonal striae laterally; region between S2 and S5 reticulate, region posterior to S5 with undulating transverse striae. Setae j1 13, j3 17, j4 11, j5 11, j6 more than 9 (tip broken), J2 more than 9 (tip broken), J5 12, z2 14, z4 15, z5 10, Z1 15, Z4 more than 35 (tip broken), Z5 53, s4 21, S2 21, S4 18, S5 19, r3 15, R1 14. All setae smooth, except Z4 and Z5, serrate.

Peritreme - Extending to base of j1.

Venter - Sternal shield with few lateral striae, posterior margin concave; distances between St1-St3 58, St2-St2 59. Genital shield smooth; distance between St5-St5 55. Ventrianal shield pentagonal, striate anteriorly to preanal pores and reticulate posteriorly, anterior margin almost straight, 113 long, 93 wide at level of Zv2 and 88 wide at level of anus, with a pair of elliptical pores mesad and slightly posterior to Jv2. Two pairs of

metapodal shields. Caudovernal setae smooth and sharp-tipped, except Jv5 lightly serrate.

Chelicera - Movable digit 30 long, with 1 tooth; fixed digit 28 long, with 5 teeth and a *pilus dentilis*.

Spermatheca - Calyx tubular 24 long, with the distal fourth constricted and slender; atrium forked.

Legs - Sharp-tipped macroseta; St IV 53. 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 *Eragrostis arenicola*, 21 km N Mporokoso, **Zambia**, 15-VI-1992, A. Onzo, deposited at ESALQ-USP.

ETYMOLOGY - The epithet *constricticervix* refers to the shape of the spermatheca of this new species.

REMARKS - *Neoseiulus aurescens* (Athias-Henriot, 1961) and *Neoseiulus exiguus* (Van der Merwe, 1968) resemble this new species, but the dorsal shield of these species is entirely reticulate. Furthermore, the former has Z4 about 30% shorter and the constricted region of spermathecal calyx about 3x shorter while the latter has sternal shield much longer than wide; 3 teeth on movable cheliceral digit and macroseta of tarsus IV about 20% shorter.

DISTRIBUTION - Zambia.

***Neoseiulus erugatus* Ragusa and Athias-Henriot**

Neoseiulus erugatus Ragusa and Athias-Henriot, 1983: 671; Chant and McMurtry, 2003: 35; Moraes *et al.*, 2004: 119.

REMARKS - This species was described from specimens collected in Ivory Coast in soil. No additional specimens were collected in this study. The synonymy between this species and *N. barkeri* is discussed in the remarks section of the latter.

DISTRIBUTION - Ivory Coast.

***Neoseiulus exiguus* (Van der Merwe) (Fig. 12)**

Amblyseiulus (Amblyseiulus) exiguus Van der Merwe, 1968: 128; Ueckermann and Loots, 1988: 146.

Neoseiulus exiguus, Chant and McMurtry, 2003: 37; Moraes *et al.*, 2004: 119.

FEMALE - Five specimens measured (South Africa: 5).

Dorsum - Dorsal shield 327(309-340) long, 149 (135-164) wide, reticulate. Setae j1 14(13-16), j3 17(16-19), j4 13, j5 13, j6 14(13-16), J2 15(13-19), J5 11(9-13), z2 16(14-16), z4 15(13-16), z5 13, Z1 17(14-22), Z4 28(25-32), Z5 39(35-47), s4 20(19-22), S2 20(19-22), S4 19(18-22), S5 19(18-22), r3 16, R1 16(13-16). Dorsal setae short and smooth, except Z4 and Z5, serrate.

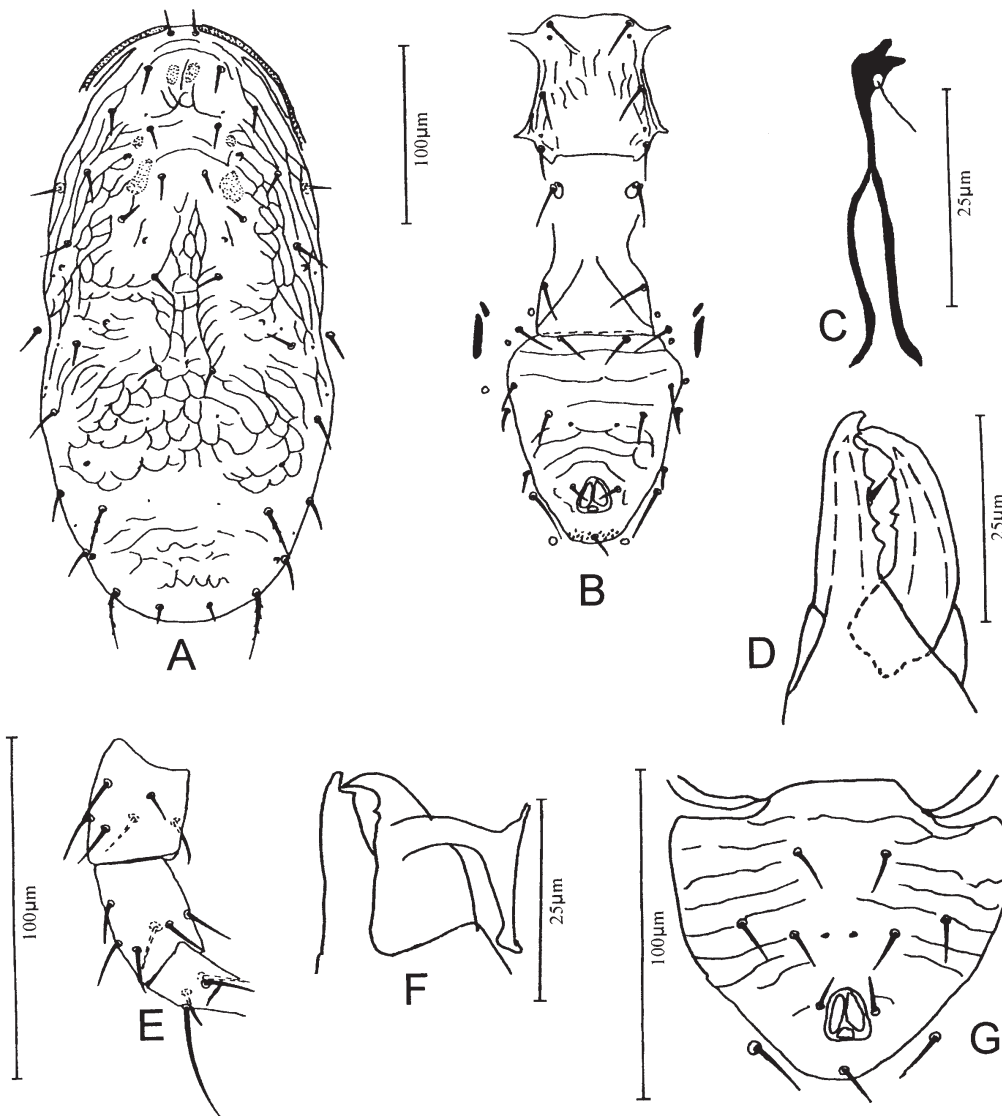


Fig. 12. *Neoseiulus exiguus* (Van der Merwe) - A. Female dorsal shield; B. Female ventral surface; C. Spermatheca; D. Female chelicera, E. Female leg IV; F. Spermatodactyl; G. Male ventrianal shield.

Peritreme - Extending to base of j1.

Venter - Sternal shield with few striae, posterior margin concave; distances between St1-St3 59(57-61), St2-St2 52(47-54). Genital shield smooth; distance between St5-St5 51(49-54). Ventrianal shield pentagonal with transverse striae anteriorly to Jv2, with some reticulation posteriorly to Jv2, anterior margin slightly convex, 115(104-123) long and 99(91-104) wide at level of Zv2 and 70(63-76) at level of anus, with a pair of small and round preanal pores mesad and slightly posterior to Jv2. Two pairs of metapodal shields. Caudoventral setae smooth and sharp-tipped.

Chelicera - Movable digit 28 long, with 3 teeth, the middle one very small, the proximal one close to base of digit and not always visible; fixed digit 25 long, with 5-6

teeth and a *pilus dentilis*, the tooth next to the *pilus dentilis* not always clearly visible.

Spermatheca - Calyx tubular, 32 long, but constricted in third near bifid atrium.

Legs - Macroseta pointed distally; St IV 44(35-60). Chaetotaxy: genu II: 2-2/0,2/0- 1; Sge III: 1-2/1,2/0-1.

MALE - Four specimens measured (South Africa: 4).

Dorsum - Dorsal shield 262(258-268) long, 135 (126-145) wide, shield pattern as in female. Setae j1 10(9-13), j3 13(13-14), j4 10(9-13), j5 11(9-13), j6 10(9-13), J2 11(9-13), J5 9, z2 13, z4 13, z5 11(9-13), Z1 13, Z4 23(22-26), Z5 31(28-33), s4 16, S2 16, S4 16, S5 16, r3 13, R1 13. All setae smooth, except Z4 and Z5, lightly serrate.

Peritreme - Extending to level of j1.

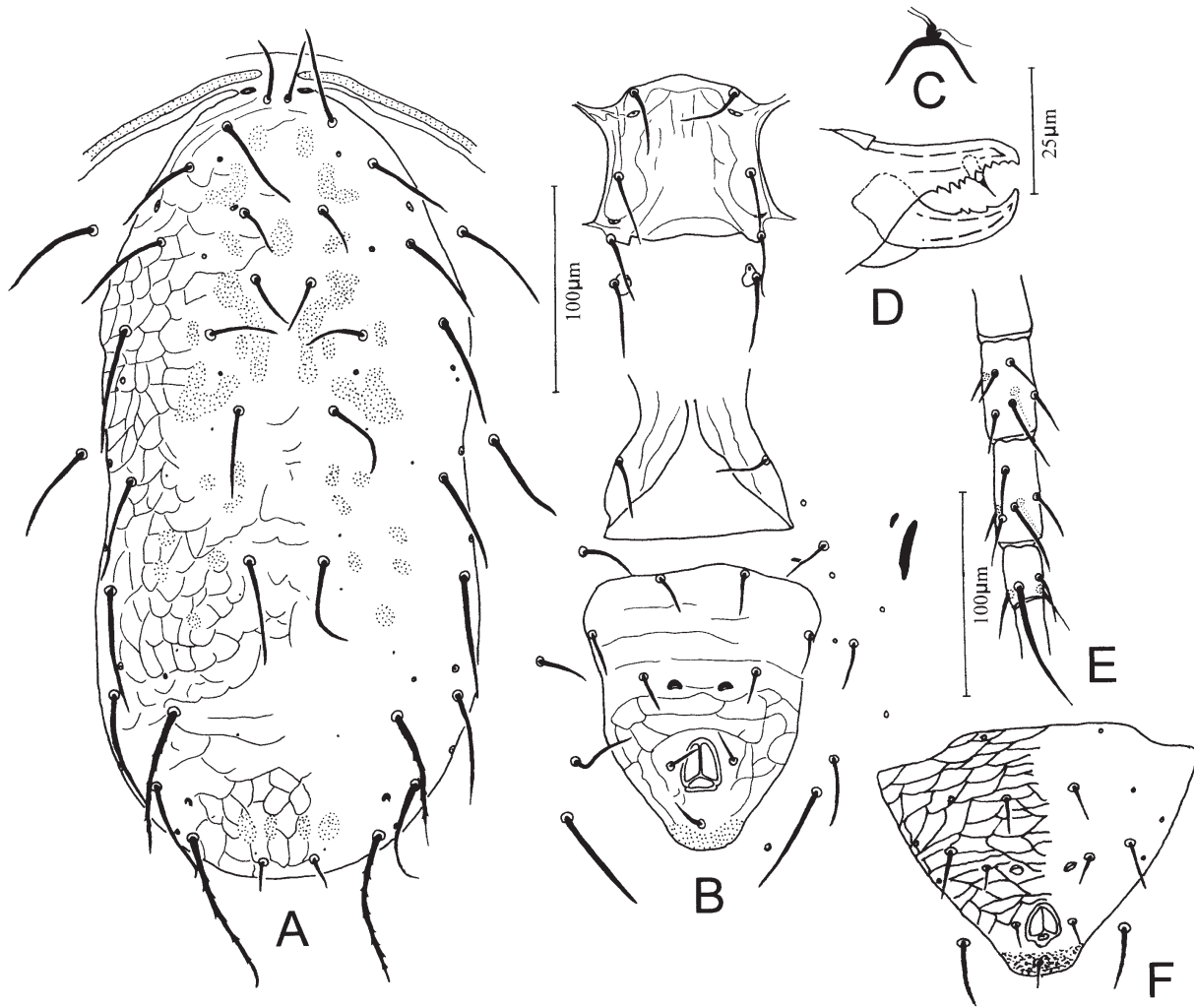


Fig. 13. *Neoseiulus knappi* Zannou, Moraes, Ueckermann and Oliveira n. sp. - A. Female dorsal shield; B. Female ventral surface; C. Spermatheca; D. Female chelicera, E. Female leg IV; F. Male ventrianal shield.

Venter - Ventrianal shield subtriangular to pentagonal with transversal striae; 108(103-113) long and 119(117-120) wide at anterior corners; with 3 pairs of preanal setae, a pair preanal pores almost in line with Jv2, lyrifissures not visible.

Spermatodactyl - T-shaped, shaft 13 long.

Legs - Macroseta pointed distally; St IV 34(32-38). Chaetotaxy of genua II and III same as in female.

SPECIMENS EXAMINED - Six females and three males, **South Africa:** Potchefstroom, North-West Province, from pastures, X-1963, G.C. Loots; Golden Gate National Park, Free State Province, from *Lithospermum cinereum*, 09-II-1982, E.A. Ueckermann; Mountain Zebra National Park, Eastern Cape Province, from *Diospyros australafricana*, 05-III-1986, M.K.P. Smith Meyer; 10 km from Colesburg to Norvalspont, Northern Cape Province, from *Pentzia globosa*, 04-III-1986, M.K.P. Smith Meyer.

DISTRIBUTION - South Africa.

***Neoseiulus knappi* Zannou, Moraes, Ueckermann and Oliveira n. sp. (Fig. 13)**

DIAGNOSIS - This species is distinct by having r3 and R1 long, sternal and genital shield striate and ventrianal shield striate anteriorly to preanal pores and reticulate posteriorly, spermathecal calyx cup-shaped, 3 and 8-9 teeth on movable and fixed cheliceral digits, respectively, and macrosetae on genu, tibia and tarsus of leg IV.

FEMALE - Twelve specimens measured.

Dorsum - Dorsal shield 386(336-400) long, 187(168-198) wide, reticulate. Setae j1 29(26-32), j3 45(43-48), j4 25(24-27), j5 28(26-31), j6 39(35-43), J2 47(43-51), J5 14(11-14), z2 40(35-42), z4 48(45-53), z5 27(24-30), Z1 47(45-51), Z4 62(56-68) Z5, 73(68-78), s4 55(53-57), S2 56(49-59), S4 57(54-64), S5 50(43-54), r3 50(46-51), R1 49(46-51). All setae smooth, except Z4 and Z5, serrate.

Peritreme - Extending to level of j1.

Venter - Sternal shield striate, posterior margin slightly concave; distances between St1-St3 70(64-73), St2-St2 65(62-70). Genital shield striate; distance between St5-St5 66(62-72). Ventrianal shield pentagonal, striate anteriorly to preanal pores and reticulate posteriorly, anterior margin convex, 126 (119-134) long, 110(101-119) wide at level of Zv2 and 91(82-103) wide at level of anus, with a pair of elliptical pores mesad and slightly posterior to Jv2. Two pairs of metapodal shields. Caudoventral setae smooth and sharp-tipped.

Chelicera - Movable digit 33(32-33) long, with 3 teeth; fixed digit 30(30-31) long, with 8-9 teeth and a *pilus dentilis*.

Spermatheca - Calyx cup-shaped, 8(5-10) long; atrium nodular.

Legs - Sharp-tipped macrosetae; Sge IV 30(24-35), Sti 33(32-35), St IV 69(65-73). Chaetotaxy: genu II: 2-2/0,2/0-1; genu III: 1-2/1,2/0-1.

MALE - Four specimens measured.

Dorsum - Dorsal shield 282(275-296) long, 145 (135-171) wide, shield pattern as in female. Setae j1 23(22-23), j3 32(28-36), j4 22(18-26), j5 26(23-29), j6 35(33-36), J2 43(38-46), J5 11(9-13), z2 33(31-36), z4 36(35-38), z5 24(23-26), Z1 36(32-38), Z4 51(46-55), Z5 49(48-51), s4 43(41-46), S2 49(47-51), S4 42(41-43), S5 35(33-38), r3 41(38-46), R1 37(33-41). All setae smooth, except Z4 and Z5, serrate.

Peritreme - Extending to level between j1 and j3.

Venter - Ventrianal shield subtriangular and reticulate, 105(99-115) long, 124(107-150) wide at the anterior corners; with 3 pairs of preanal setae, 4 pairs of lyrifissures (1 near anterior margin, 1 lateral and almost in line with Jv1, 1 lateral and well posterior to Jv1 and 1 lateral and slightly posterior to Zv2) and a pair of elliptical pores mesad and slightly posterior to Jv2.

Spermatodactyl - Shaft 15 long.

Legs - Macrosetae sharp-tipped; Sge IV 26(26-27), Sti IV 28(27-29) and St IV 48(46-52). Chaetotaxy of genera II and III same as in female.

LOCALITY AND TYPE MATERIAL - Holotype female, allotype male and 1 paratype female, from *Soja hispida*, Imbo, **Burundi**, 14-VI-1990, P. Ndayirajije, deposited at ESALQ-USP; 1 paratype female from *Pluchea ovalis*, Mugeroro, **Burundi**, 24-VII-1990, P. Ndayirajije, deposited at IITAIM; 1 paratype female from *Manihot esculenta*, 16 km N Natitingou, Atacora Province, Benin, 20-XI-1989, A. Onzo, deposited at ESALQ-USP; 7 paratype females and 3 paratype males from *Oryza sativa*, 6 km N Salima military camp, Central Province, **Malawi**, 10-V-2001, I.D. Zannou, deposited at IITAIM; 1 paratype female from *Gmelina arborea*, 6 km N Salima military camp, Central Province, **Malawi**, 21-V-2002, A. Onzo, deposited at ESALQ-USP; 4 paratype females from *Lycopersicon esculentum*, Kenya Agricultural Research Institute (KARI), National Fibre Crop Research Centre, Mwea Tebere, **Kenya**, 28-XII-1999, I. Sarr, deposited in

National Collection of Arachnida, PPRI, Pretoria, South Africa.

ETYMOLOGY - This species is named after Markus Knapp, acarologist at the International Center of Insect Physiology and Ecology (ICIPE), Nairobi, Kenya.

REMARKS - *Neoseiulus lamticus* (Athias-Henriot, 1977) is similar to this new species, but has a smooth genital shield and 1 and 7 teeth on movable and fixed cheliceral digits, respectively. *Neoseiulus fallacis* (Garnan, 1948) and *Neoseiulus fallacoides* (Tuttle and Muma, 1973) also resemble the new species, but the former has much shorter r3 and R1, at most 6 teeth on fixed cheliceral digit and reticulate sternal shield, whereas the latter has shorter peritreme (extending to level of j3), reticulate sternal shield, 2 teeth on fixed cheliceral digit, no tooth on movable digit and no macroseta on genu and tibia IV. *Neoseiulus esculentus* (El-Badry, 1968) also resembles the new species, but it has smooth dorsal shield and ventrianal shield wider than long.

DISTRIBUTION - Burundi, Kenya, Malawi.

***Neoseiulus krugeri* (Van der Merwe)
(Fig. 14)**

Amblyseius (Amblyseius) krugeri Van der Merwe, 1968: 130; Ueckermann and Loots, 1988: 155
Neoseiulus krugeri, Chant and McMurtry, 2003: 23; Moraes *et al.*, 2004: 127

FEMALE - Eight specimens measured (South Africa: 8).

Dorsum - Dorsal shield 352(328-378) long, 184 (176-192) wide, reticulate. Setae j1 22(22-23), j3 24(22-25), j4 12(9-13), j5 12(9-13), j6 13(9-16), J2 15(13-16), J5 10(9-13), z2 17(13-19), z4 17(13-19), z5 12(9-13), Z1 17(16-19), Z4 37(32-41), Z5 72(61-101), s4 29(25-32), S2 26(25-32), S4 25(22-28), S5 22(19-25), r3 20(16-22), R1 19(16-25). All setae smooth, except Z5, serrate.

Peritreme - Extending to level between j1 and j3.

Venter - Sternal shield smooth, posterior margin almost straight; distances between St1-St3 60(57-62), St2-St2 57(55-60). Genital shield smooth; distance between St5-St5 55(52-60). Ventrianal shield pentagonal, striate anteriorly to preanal pores and reticulate posteriorly, anterior margin straight, 117(110-126) long and 94(88-101) wide at level of Zv2 and 81(76-85) at level of anus, with a pair of small and round preanal pores mesad and slightly posterior to Jv2. Two pairs of metapodal shields. Caudoventral setae smooth and sharp-tipped.

Chelicera - Movable digit 31(30-32) long, with 1-2 teeth; fixed digit 28(25-28) long, with 5-8 teeth and a *pilus dentilis*.

Spermatheca - Calyx bell-shaped, 16 long; atrium small, nodular.

Legs - Macrosetae pointed distally; Sge III 23(22-25), Sge IV 39(33-41), Sti IV 34(30-38), St IV 70(62-88). Chaetotaxy: genu II: 2-2/1,2/0-1; genu III: 1-2/1,2/0-1.

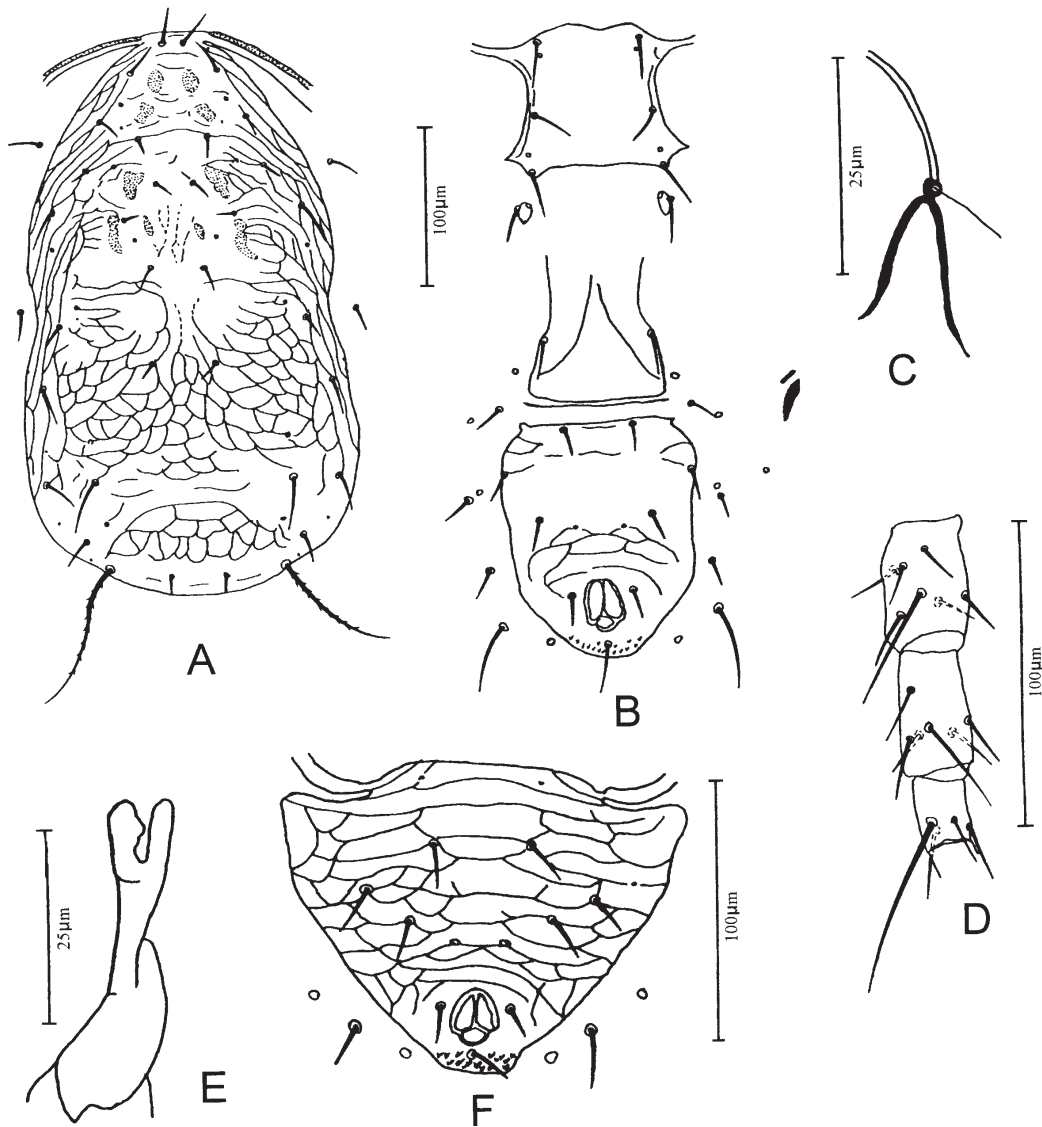


Fig. 14. *Neoseiulus krugeri* (Van der Merwe) - A. Female dorsal shield; B. Female ventral surface; C. Spermatheca; D. Female leg IV; E. Spermatodactyl; F. Male ventrianal shield.

MALE - Four specimens measured (South Africa: 4).

Dorsum - Dorsal shield 274(268-284) long, 166 (161-170) wide, shield pattern as in female. Setae j1 24(22-25), j3 13, j4 13, j5 15(13-16), j6 15(13-16), J2 16(14-16), J5 9, z2 19, z4 18(16-19), z5 13, Z1 18(16-19), Z4 34(32-35), Z5 46(44-50), s4 25, S2 24(22-25), S4 22(20-22), S5 21(17-22), r3 19, R1 18(16-19). All setae smooth, except Z5, serrate.

Peritreme - Extending to level of j1.

Venter - Ventrianal shield triangular and reticulate; 116(110-120) long and 143(135-148) wide at anterior corners; with 3 pairs of preanal setae, a pair of preanal pores; lyrifissures not visible.

Spermatodactyl - Forked distally, shaft 20(19-22) long.

Legs - Macrosetae sharp-tipped, Sge III of male not distinctly longer than other setae on segment; Sge IV 26(25-28), Sti IV 25, St IV 59(57-63). Chaetotaxy of genua II and III same as in female.

SPECIMENS EXAMINED - Twenty five females and four males, **South Africa**: Mlam-bane, Kruger National Park, Mpumalanga Province, from *Ficus sycamoros*, 04-X-1963, G.G. Van der Merwe; Reitz, Free State Province, from *Medicago sativa*, 18-II-1994, E.A. Ueckermann; Stille Rust, Kamberg National Park, Kwazulu/Natal Province, from *Hydrangea hortensia* and *Verbena bonariensis* 15-I-1991, M.K.P. Smith Meyer; Mountain Zebra National Park, Eastern cape Province, from *Salix* sp., 12-III-1986, E.A. Ueckermann; Golden Gate National Park, Free State Province, from *Chenopodium album*, *Papaver aculeatum* and *Cliffortia*

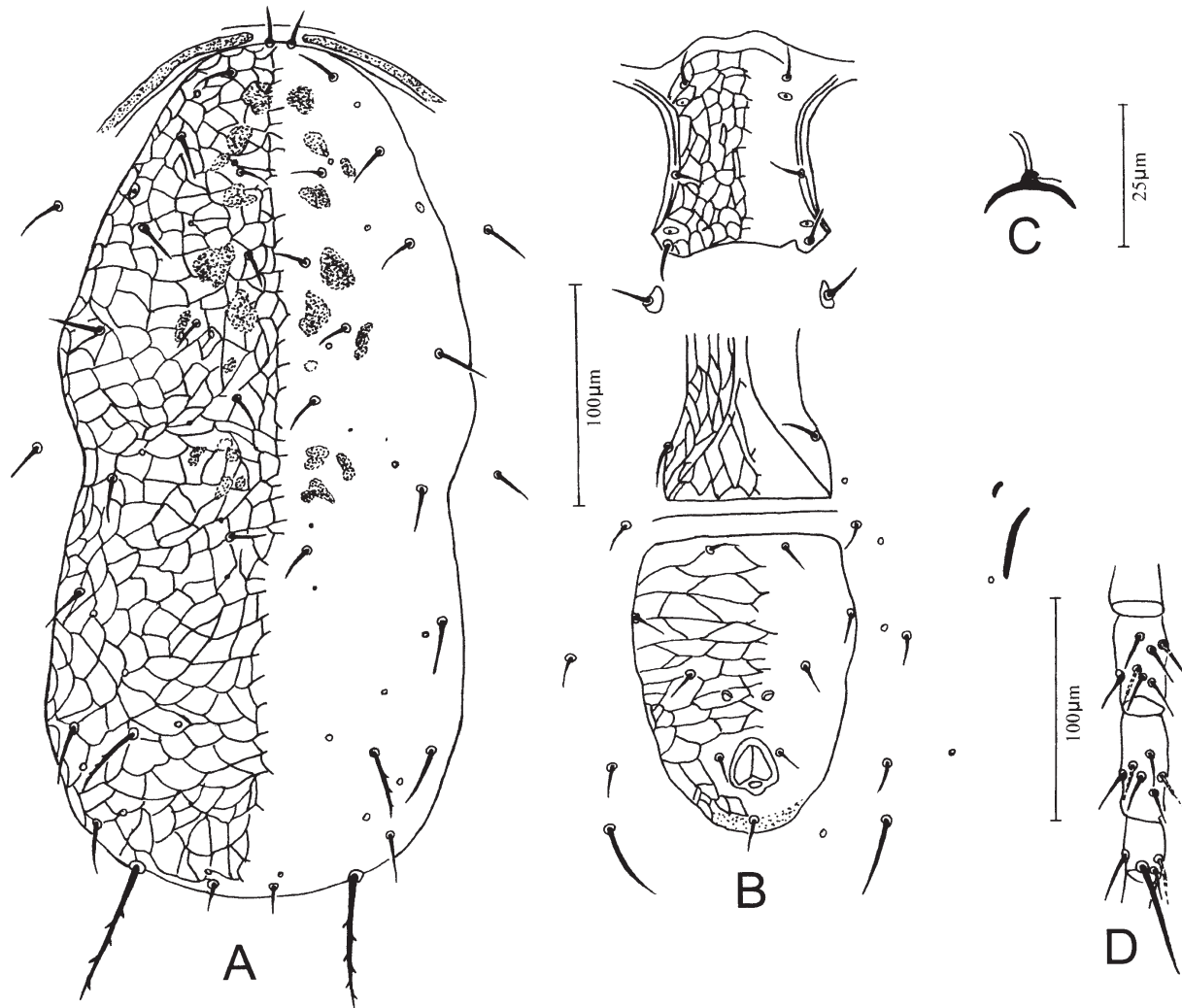


Fig. 15. *Neoseiulus lula* (Pritchard and Baker) (female) - A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Leg IV.

linearifolia, 09-II-1982, E.A. Ueckermann; 10 km from Devon to Delmas, Gauteng Province, from *Hypoxis rooperi*, 13-I-1982, E.A. Ueckermann.

REMARKS - The holotype and the paratype females, collected in the Kruger National Park bear 2 teeth on the movable cheliceral digit and 8 teeth on the fixed digit, however, in all material subsequently collected the movable digit bears 1 tooth and the fixed digit 5-6 teeth.

Neoseiulus krugeri and *Neoseiulus sehlabatei* (El-Banhawy) are very similar and may be synonymous. The synonymy between the two species is not officially proposed here because we did not examine the holotype of *N. sehlabatei* in this study.

DISTRIBUTION - Lesotho, and South Africa.

Neoseiulus lamticus (Athias-Henriot).

Cydnodromus lamticus Athias-Henriot, 1977: 70.

Amblyseius (Amblyseius) lamticus, Ueckermann and Loots, 1988: 135.

Neoseiulus lamticus, Chant and McMurtry, 2003: 23; Moraes *et al.*, 2004: 127.

REMARKS - This species was described from specimens collected in Lamto, Ivory Coast in soil. No additional specimens were collected in this study.

DISTRIBUTION - Ivory Coast.

Neoseiulus liticellus (Athias-Henriot)

Amblyseius liticellus Athias-Henriot, 1966: 216.

Amblyseius (Amblyseius) liticellus, Ueckermann and Loots, 1988: 153.

Neoseiulus liticellus, Chant and McMurtry, 2003; Moraes *et al.*, 2004.

REMARKS - This species was described from specimens collected in Algeria, on dry banana leaves brought from Guinea. No additional specimens were collected in this study.

Neoseiulus liticellus may be a synonym of *Neoseiulus makuwa* (Ehara) but synonymy is not officially proposed in this paper because the holotypes of the two species were not examined in this study. Since *Neoseiulus liticellus* was described from Africa and *N. makuwa* from Asia, the redescrbed this species as *N. makuwa* bearing in mind that this species may eventually be synonymized with *N. liticellus*.

DISTRIBUTION - Azerbaijan, Canary Islands, and Guinea.

***Neoseiulus lula* (Pritchard and Baker)
(Fig. 15)**

Amblyseius (Amblyseius) lula Pritchard and Baker, 1962: 239.

Neoseiulus lula, Chant and McMurtry, 2003: 27; Moraes *et al.*, 2004: 130.

Amblyseius (Amblyseius) insignitus Van der Merwe, 1968: 138 (synonym according Ueckermann and Loots, 1988).

FEMALE - Four specimens measured (Benin: 2; Democratic Republic of Congo: holotype; Tanzania: 1).

Dorsum - Dorsal shield 386(381-393) [389] long, 196(182-211) [191] wide, reticulate. Setae j1 21(19-23) [19], j3 23(22-24) [22], j4 15(14-16) [14], j5 14(13-16) [14], j6 18(18-19) [17], J2 19(19-20) [18], J5 11(10-13) [13], z2 20(19-21) [19], z4 21(20-22) [20], z5 16(15-16) [16], Z1 21(19-22) [24], Z4 35(30-43) [28], Z5 65(64-66) [60], s4 25(23-27) [25], S2 27(25-29) [25], S4 28(26-30) [25], S5 27(26-29) [25], r3 21(19-22) [24], R1 22(20-24) [22]. All setae smooth, except Z4 and Z5, serrate;

Peritreme - Extending to level of j1.

Venter - Sternal shield reticulate, posterior margin slightly concave; distances between St1-St3 77(77-78) [78], St2-St2 61(58-64) [59]. Genital shield striate; distance between St5-St5 67(62-70) [66]. Ventrianal shield pentagonal, striate anteriorly to Jv2, reticulate posteriorly, anterior margin almost straight, 137(133-139) [138] long, 107(102-110) [107] wide at level of Zv2 and 85(77-91) [86] wide at level of anus, with a pair of elliptical pores posteromesad to Jv2. Two pairs of metapodal shields. Caudovernal setae smooth and sharp-tipped.

Chelicera - Movable digit 35 long, with 1 tooth; fixed digit 32 long, with 8 teeth and a *pilus dentilis*.

Spermatheca - Calyx disc-shaped, 5 long, 11(11-12) in diameter; atrium nodular.

Legs - Macroseta with a tiny knob; St IV 56(53-59) [55]. Chaetotaxy: genu II: 2-2/0, 2/0-1; genu III: 1-2/1,2/0-1.

SPECIMENS EXAMINED - Four females, **Benin**: Setto, Zou Province, on unknown plant, 05-IX-1991, B.

Eklou; Glazoue, Zou Province, on unknown plant, 18-XI-1991, B. Eklou. **Democratic Republic of Congo**: Holotype female from Kinshasa (= Leopoldville), Djoue, on Leguminosae, 15-IV-1955, E. W. Baker. Two females, **Tanzania**: Igawa, on *Bambusa* sp., 16-VIII-1994, A. Onzo.

REMARKS - According to the original description and to the redescription provided by Schicha (1981), there are no macrosetae on genu IV and tibia IV. Re-examination of the holotype indicated the presence of macrosetae on genu IV (20) and tibia IV (24).

DISTRIBUTION - Benin, Canary Islands, Cape Verde, Democratic Republic of Congo, Lesotho, South Africa, and Tanzania.

***Neoseiulus makuwa* (Ehara)
(Fig. 16)**

Amblyseius (Amblyseius) makuwa Ehara, 1972: 154.

Amblyseius makuwa, Wu *et al.*, 1991: 89.

Amblyseius (Neoseiulus) makuwa, Ehara and Amano, 1998: 37.

Neoseiulus makuwa, Chant and McMurtry, 2003: 37; Moraes *et al.*, 2004: 131.

FEMALE - One specimen measured (Cameroon: 1).

Dorsum - Dorsal shield 318 long, 197 wide, smooth. Setae j1 18, j3 21, j4 10, j5 12, j6 11, J2 12, J5 9, z2 15, z4 14, z5 10, Z1 13, Z4 39, Z5 55, s4 30, S2 18, S4 14, S5 13, r3 16, R1 12. All setae smooth, except Z5, serrate.

Peritreme - Extending beyond base of j1.

Venter - Sternal shield with scarce lateral striae, posterior margin concave; distances between St1-St3 42, St2-St2 55. Genital shield smooth; distance between St5-St5 60. Ventrianal shield pentagonal with transverse striae, anterior margin straight, 110 long, 85 wide at level of Zv2 and 60 wide at level of anus, with a pair of elliptical pores mesad and almost in line with Jv2. Two pairs of metapodal shields. Caudovernal setae smooth and sharp-tipped.

Chelicera - Movable digit 32 long, apparently with 1 tooth; fixed digit 30 long, apparently with 5 teeth and a *pilus dentilis*.

Spermatheca - Calyx trumpet-shaped, 40 long; atrium forked.

Legs - Macrosetae sharp-tipped; Sge IV 42, St IV 55. Chaetotaxy: genu II: 2-2/0,2/0-1; genu III: 1-2/1, 2/0-1.

SPECIMENS EXAMINED - One female, **Cameroon**: 20 km W Akom, Southern Province, on *Ageratum conyzoides*, 07-II-1991, A. Onzo.

REMARKS - This species is reported for the first time in Africa. The synonymy between this species and *N. liticellus* is discussed in the remarks section of the latter.

DISTRIBUTION - Cameroon, China, Indonesia, Japan, South Korea, Taiwan and USA.

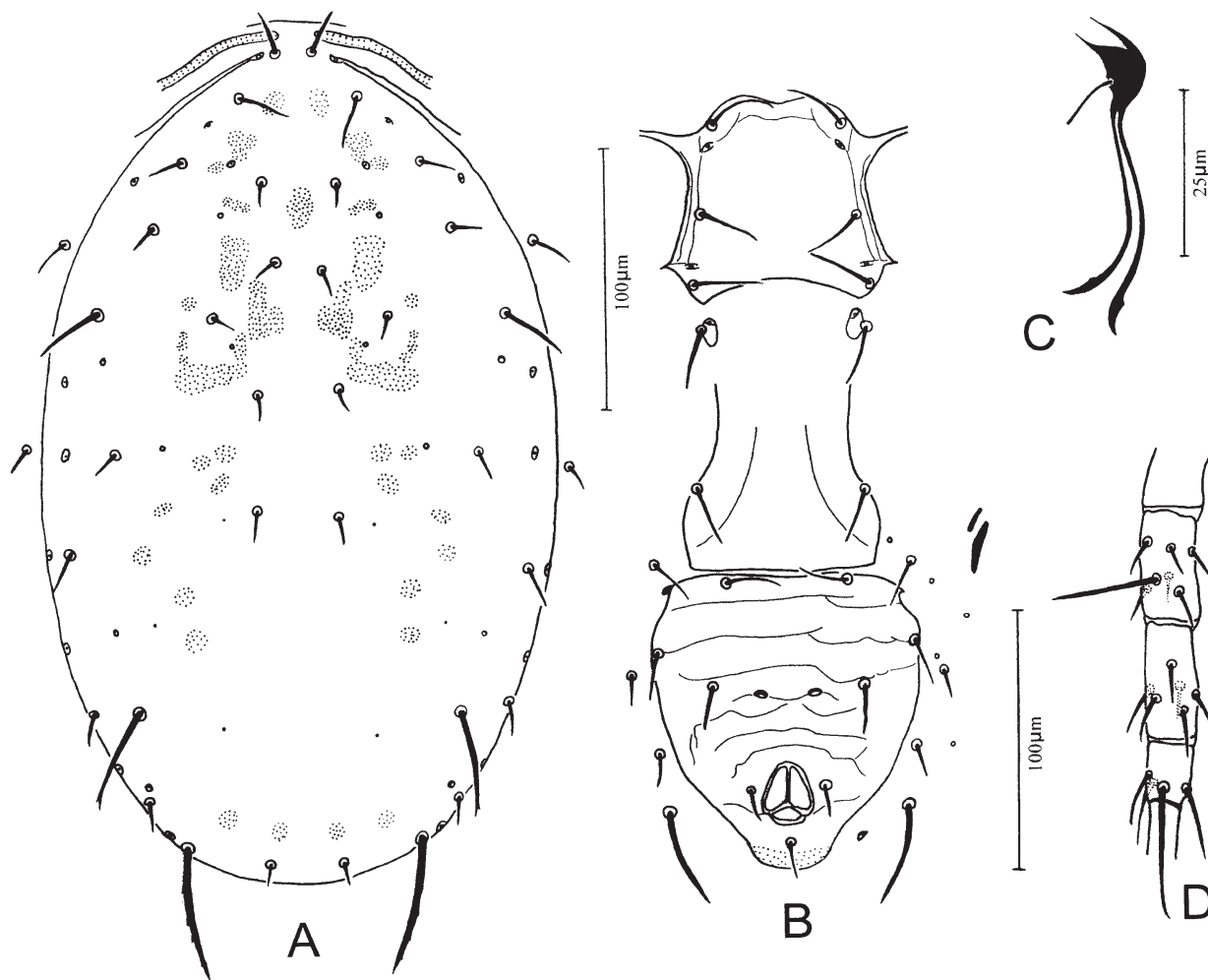


Fig. 16. *Neoseiulus makuwa* (Ehara) (female) - A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Leg IV.

***Neoseiulus mebeloi* Zannou, Moraes and Oliveira
n. sp. (Fig. 17)**

DIAGNOSIS - This species is distinct by having the peritreme relatively short (extending to j3), calyx of spermatheca bell-shaped, long atrium and major duct bulbous near atrium.

FEMALE - Seven specimens measured.

Dorsum - Dorsal shield 301(295-310) long, 163 (157-170), mostly smooth, with a few lateral striae. Setae j1 16(13-17), j3 27(25-28), j4 25(23-27), j5 25(24-26), j6 29(28-30), J2 33(33-34), J5 10(9-12), z2 26(25-27), z4 31(29-33), z5 24(22-25), Z1 34(32-36), Z4 45(44-46) Z5 49(47-50), s4 37(36-39), S2 40(38-41), S4 33(31-35), S5 28(27-30), r3 27(25-30), R1 24(22-25). All setae smooth, except Z4 and Z5, serrate.

Peritreme - Extending almost to level of j3.

Venter - Sternal shield with scarce lateral striae, posterior margin slightly concave; distances between

St1-St3 57(56-59), St2-St2 54(53-55). Genital shield smooth; distance between St5-St5 50(49-52). Ventrianal shield pentagonal, with transverse striae, anterior margin straight, 101(99-102) long, 87(81-92) wide at level of Zv2 and 78(75-81) wide at level of anus, with a pair of round pores mesad and slightly posterior to Jv2. Two pairs of metapodal shields. Caudoventral setae smooth and sharp-tipped, except Jv5, serrate.

Chelicera - Movable digit 27(26-27) long, with 1 tooth; fixed digit 23(22-23) long, with 3 teeth and a *pilus dentilis*.

Spermatheca - Calyx bell-shaped, 13(12-13) long; junction of atrium and major duct vacuolate.

Legs - Sharp-tipped macroseta; St IV 57(56-59).
Chaetotaxy: genu II: 2-2/0,2/1-1; genu III: 1-2/1,2/0-1.

MALE - Unknown.

LOCALITY AND TYPE MATERIAL - Holotype female and 3 paratype females from *Eragrostis arenicola*, 21 km N Mporokoso, **Zambia**, 15-VI-1992, A. Onzo, de-

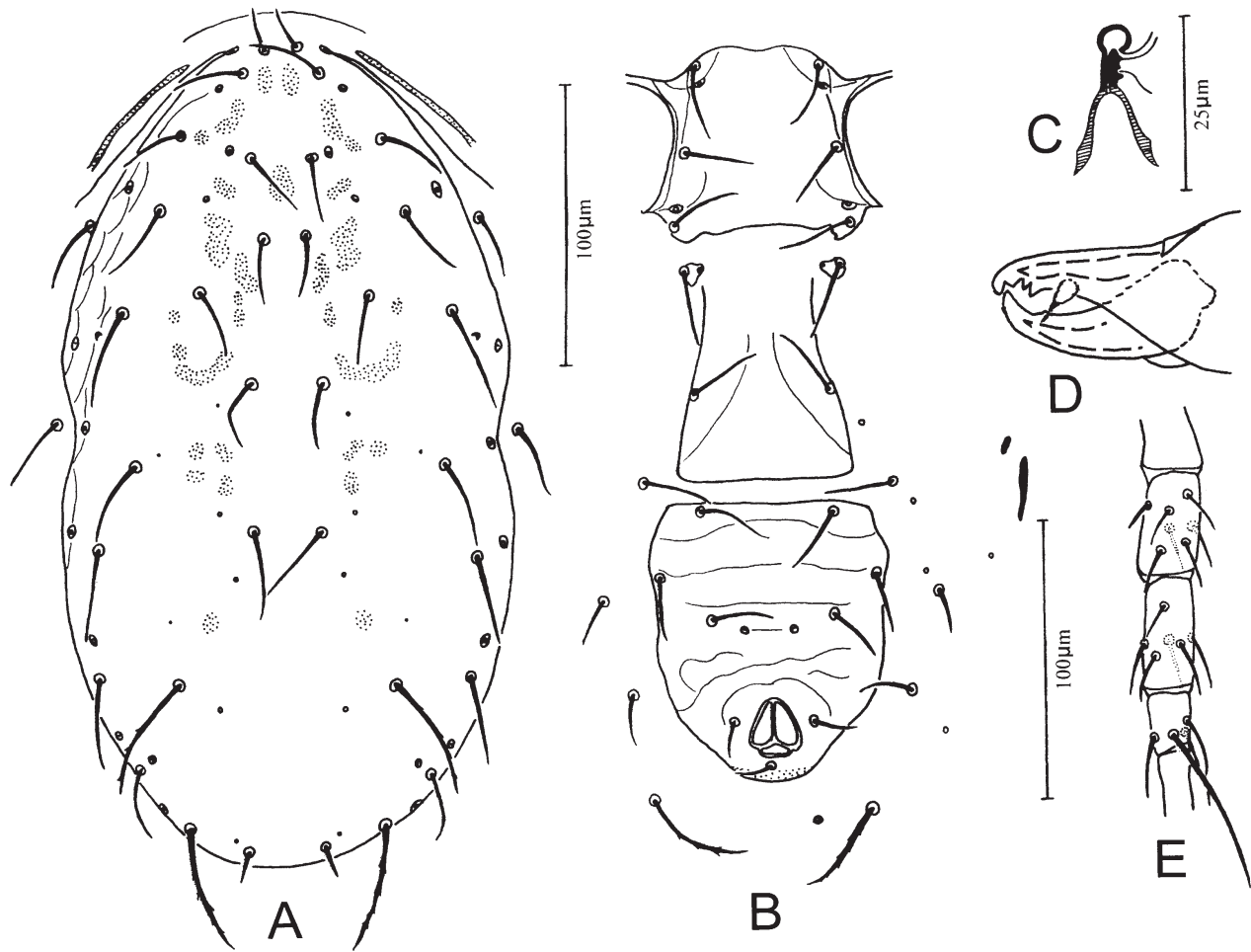


Fig. 17. *Neoseiulus mebeloi* Zannou, Moraes and Oliveira **n. sp.** (female) - A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Chelicera; E. Leg IV.

posited at ESALQ-USP; 1 paratype female from *Pterocarpus angolensis*, 21 km N Mporokoso, **Zambia**, 15-VI-1992, J.S. Yaninek, deposited at ESALQ-USP; 2 paratype females from *Hyparrhenia filipendula*, 35 km W Mporokoso, **Zambia**, 14-VI-1992, A. Onzo, deposited at IITAIM; 1 paratype female from *Crassocephalum rubens*, 20 km NW Kasama, **Zambia**, 15-VI-1992, A. Onzo, deposited at IITAIM; 1 paratype female from *Vitex doniana*, 20 km NW Kasama, **Zambia**, 15-VI-1992, A. Onzo, deposited at ESALQ-USP.

ETYMOLOGY - This new species is named after Milimo Mebelo, a Zambian acarologist, deceased in 2002.

REMARKS - *Neoseiulus ornatus* (Liang and Ke, 1984) and *Neoseiulus inornatus* (Schuster and Pritchard, 1963) are similar to this new species. The former differs by having the calyx of spermatheca tubular and the latter, by having dorsal shield lightly reticulate, S2 about 50%, Z4 about 65% and Z5 about 60% longer, and shorter atrium. *Neoseiulus marginatus* (Wainstein, 1961) and *Neoseiulus mckenziei* (Schuster and Pritchard, 1963) re-

semble the new species, but the former has shorter dorso-central setae, and calyx of spermatheca abruptly constricted near atrium, whereas the latter has long and slender calyx of spermatheca.

DISTRIBUTION - Zambia.

***Neoseiulus neobaraki* Zannou, Moraes and Oliveira
n. sp. (Fig. 18)**

DIAGNOSIS - This species is characterized by having J5 serrate, Z4 at least as long as the distance between its base and the base of S5, preanal pores close to each other, calyx of spermatheca popular, presence of 2 and 12 teeth on movable and fixed cheliceral digits, respectively, and presence of macrosetae on legs III and IV.

FEMALE - Four specimens measured.

Dorsum - Dorsal shield 378 (370-385) long, 179 (171-188) wide, strongly reticulate. Setae j1 22 (20-23), j3 25(25-26), j4 13(12-13), j5 13(12-14), j6 16 (15-16), J2 14(14-15), J5 17(16-18), z2 16(15-17), z4 18(17-18), z5 12(11-12), Z1 16(14-18), Z4 28(26-29) Z5 69(63-72), s4

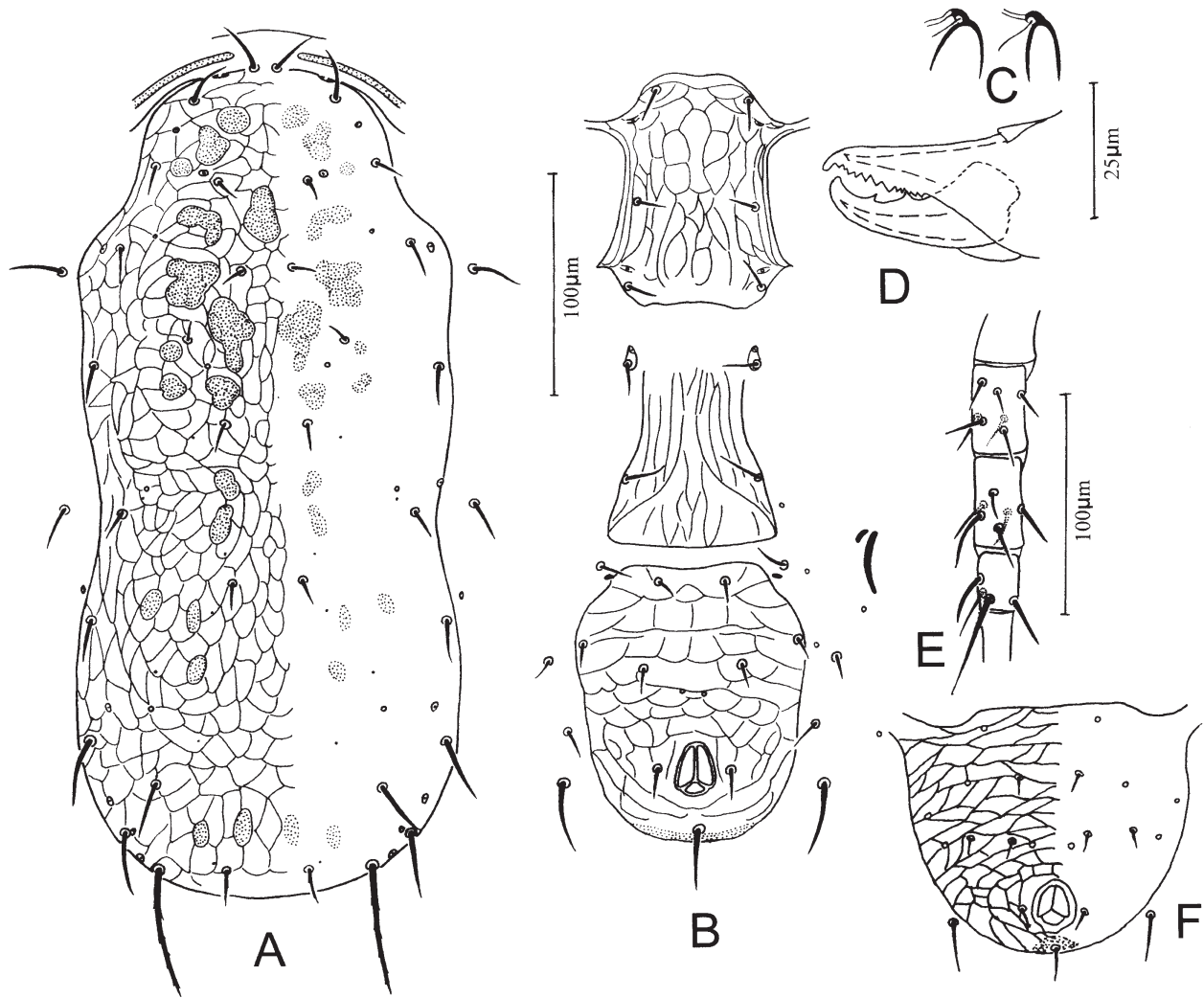


Fig. 18. *Neoseiulus neobaraki* Zannou, Moraes and Oliveira n. sp. - A. Female dorsal shield; B. Female ventral surface; C. Spermatheca; D. Chelicera, E. Female leg IV; F. Male ventrianal shield.

22(21-23), S2 22(21-23), S4 32(31-34), S5 32(30-33), r3 22(21-24), R1 20(18-21). All setae smooth, except J5 and Z5, serrate.

Peritreme - Extending almost to level of j1.

Venter - Sternal shield reticulate, posterior margin slightly concave; distances between St1-St3 89(87-92), St2-St2 57(56-60). Genital shield longitudinally striate; distance between St5-St5 63(56-70). Ventrianal shield quadrate, reticulate, anterior margin slightly concave, 128(123-135) long, 106(101-110) wide at level of Zv2 and 94(90-97) wide at level of anus, with a pair of round pores close to each other, mesad and slightly posterior to Jv2. Two pairs of metapodal shields. Caudoventral setae smooth and sharp-tipped.

Chelicera - Movable digit 36 long, with 2 teeth; fixed digit 35 long, with 12 teeth and a *pilus dentilis*.

Spermatheca - Calyx pocular, 13(12-13) long; atrium nodular.

Legs - Macrosetae blunt; Sge III 17(17-18), Sti III 18(16-19), Sge IV 21(19-24), Sti IV 29(27-31), St IV 50(47-52). Chaetotaxy: genu II 2-2/0,2/0-1; genu III 1-2/1,2/0-1.

MALE - Three specimens measured.

Dorsum - Dorsal shield 333(308-350) long, 149 (145-153) wide, shield pattern as in female. Setae j1 18(17-19), j3 19(19-20), j4 11(10-11), j5 11(10-11), j6 13(12-14), J2 12(11-12), J5 14(13-15), z2 12, z4 14(13-14), z5 9(9-10), Z1 12(11-12), Z4 23, Z5 60(59-60), s4 18(17-19), S2 18(17-20), S4 26(25-27), S5 26(25-27), r3 19(18-19), R1 15(15-16). All Setae smooth, except J5 and Z5, serrate.

Peritreme - Extending to level between j1 and j3.

Venter - Ventrianal shield subtriangular, reticulate; 110(110-111) long, 133(131-136) wide at the anterior corners; with 3 pairs of preanal setae, 4 pairs of lyrifissures (1 near anterior margin, 1 lateral and almost in line with Jv1, 1 lateral and well posterior to Jv1 and 1 lat-

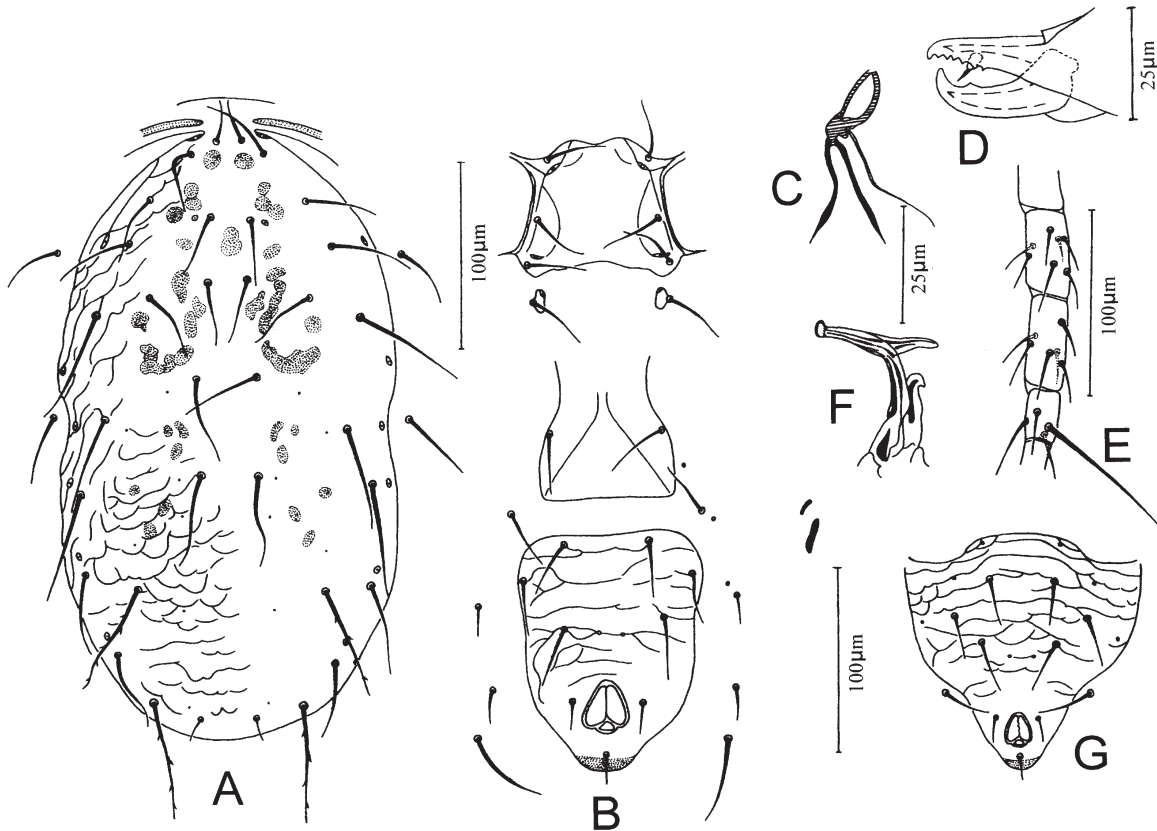


Fig. 19. *Neoseiulus onzoi* Zannou, Moraes and Oliveira n. sp. - A. Female dorsal shield; B. Female ventral surface; C. Spermatheca; D. Female chelicera, E. Female leg IV; F. Spermatodactyl; G. Male ventrianal shield.

eral and slightly posterior to $Zv2$) and a pair of round pores mesad and almost in line with $Jv2$.

Spermatodactyl - Shaft 17(16-17) long.

Legs - Macrosetae sharp-tipped on leg III and with very tiny knobs on leg IV; Sge III 12(12-13), Sti III 13(12-13), Sge IV 15(14-16), Sti IV 23(23-24) and St IV 44(42-45). Chaetotaxy of genua II and III same as in female.

LOCALITY AND TYPE MATERIAL - Holotype female from *Andropogon gayanus*, 11 km E Eba, **Nigeria**, 16-IV-1992, A. Onzo, deposited at ESALQ-USP; 4 paratype females from *Cocos nucifera*, Misserete, Plateau Province, **Benin**, 28-IV-2000, N. Aratchige, deposited at IITAIM; 1 paratype female from *C. nucifera*, Pobe, Plateau Province, **Benin**, 28-IV-2000, N. Aratchige, deposited at IITAIM; 3 paratype females, 1 allotype male and 2 paratype males from *C. nucifera*, Avedji, Mono Province, **Benin**, 04-V-2000, N. Aratchige, deposited at ESALQ-USP.

ETYMOLOGY - The epithet *neobaraki* refers to the similarity between this species and *N. baraki*.

REMARKS - *Neoseiulus baraki* (Athias-Henriot, 1966) and *N. lula* (Pritchard and Baker, 1962) resemble this new species, but both have smooth $J5$, $Z4$ shorter than the distance between its base and the base of $S5$ and 1 tooth on movable cheliceral digit. Furthermore, the for-

mer species has only 1 macroseta (St IV) and 7 teeth on fixed cheliceral digit, whereas the latter has 1 macroseta (St IV) or 3 macrosetae (Sge IV, Sti IV and St IV) and 8 teeth on fixed cheliceral digit.

DISTRIBUTION - Benin, and Nigeria.

***Neoseiulus onzoi* Zannou, Moraes and Oliveira
n. sp. (Fig. 19)**

DIAGNOSIS - This species is characterized by a combination of the following characters: dorsal shield with anterior half smooth centrally and with diagonal striae laterally; region between $S2$ and $S5$ reticulate; region posterior to $S5$ with undulating transverse striae; setae $Z1$ as long as the distance between its base, and the base of $j6$ and longer than the distance between its base and the base of $S2$, $r3$ almost as long as $R1$; spermathecal calyx bell-shaped and junction of atrium and major duct vacuolate.

FEMALE - Four specimens measured.

Dorsum - Dorsal shield 331(326-336) long, 176 (158-196) wide, with anterior half smooth centrally and with diagonal striae laterally; region between $S2$ and $S5$ reticulate, region posterior to $S5$ with undulating transverse striae. Setae $j1$ 25(24-26), $j3$ 39(36-42), $j4$ 37(36-40), $j5$ 41(38-43), $j6$ 51(50-53), $J2$ 54(53-58), $J5$

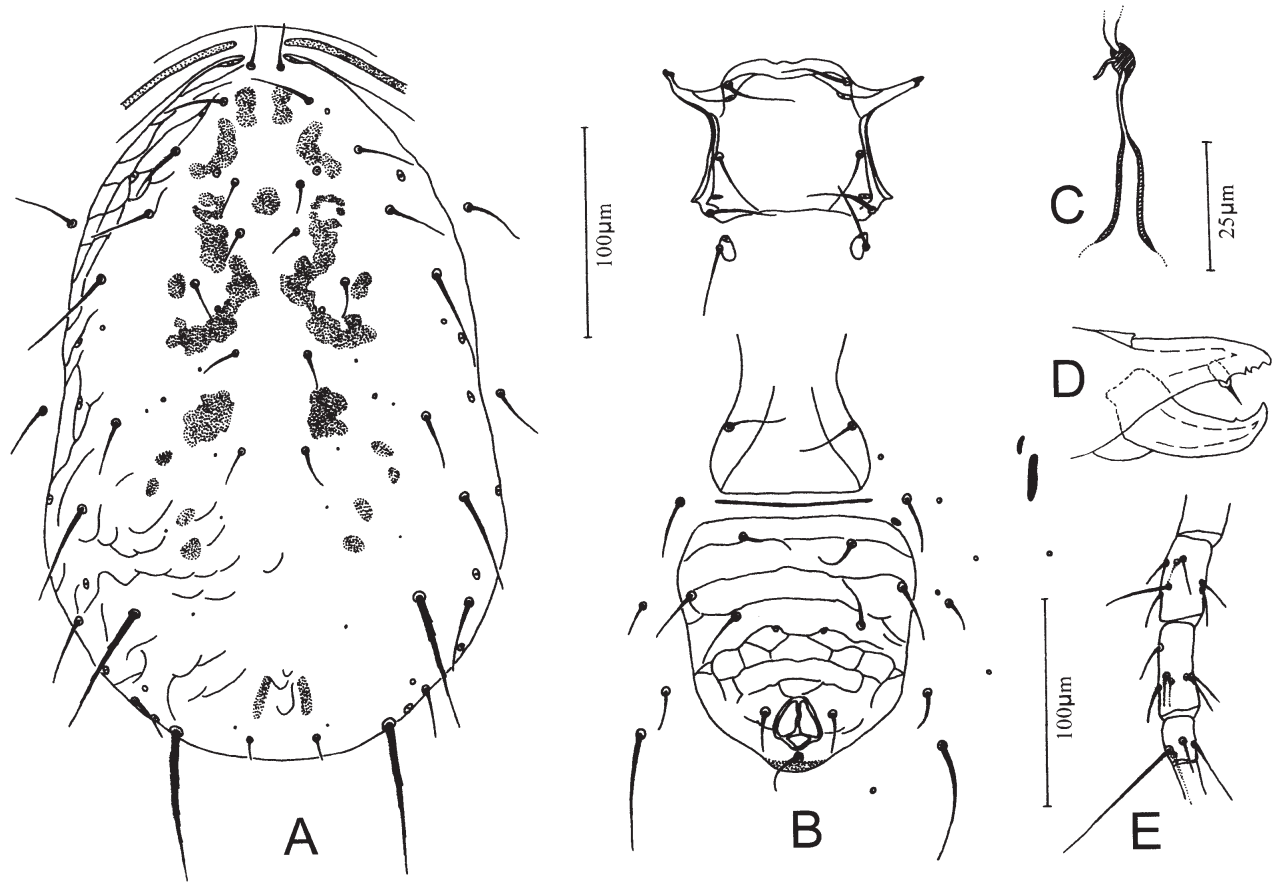


Fig. 20. *Neoseiulus scapilatus* (Van der Merwe) (female) - A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Chelicera; E. Leg IV.

12(10-13), z2 40(36-43), z4 47(43-50), z5 42(38-43), Z1 56(53-62), Z4 59(58-64) Z5 65(62-67), s4 61(58-62), S2 60(58-62), S4 45(41-51), S5 42(41-45), r3 37(36-38), R1 39(37-41). All setae smooth, except Z4 and Z5, serrate.

Peritreme - Extending to level of j1.

Venter - Sternal shield with scarce lateral tria, posterior margin slightly concave; distances between St1-St3 57(55-60), St2-St2 65(64-65). Genital shield smooth; distance between St5-St5 61(60-62). Ventrianal shield pentagonal, with mostly transverse striae, scarce reticulation, anterior margin slightly concave, 118(115-120) long, 102(101-102) wide at level of Zv2 and 88(86-89) wide at level of anus, with a pair of round pores mesad and slightly posterior to Jv2. Two pairs of metapodal shields. Caudoventral setae smooth and sharp-tipped.

Chelicera - Movable digit 32(31-33) long, with 1 tooth; fixed digit 29(28-30) long, with 6 teeth and a *pilus dentilis*.

Spermatheca - Calyx bell-shaped, 19(19-20) long; junction of atrium and major duct vacuolate.

Legs - Sharp-tipped macroseta; St IV 75(67-82). Chaetotaxy: genu II: 2-2/0,2/0-1; genu III: 1-2/1,2/0-1.

MALE - Two specimens measured.

Dorsum - Dorsal shield 262 (259-264) long, 146 (144-149) wide, shield pattern as in female. Setae j1 19, j3 32(31-34), j4 37(36-38), j5 42(41-43), j6 46, J2 48, J5 10, z2 32(31-34), z4 40(38-41), z5 42(38-46), Z1 42(41-43), Z4 54(53-55), Z5 54(53-55), s4 52(50-53), S2 46(43-48), S4 34, S5 31, r3 31(30-32), R1 31(29-34). All setae smooth, except Z4 and Z5, serrate.

Peritreme - Extending to level of j3.

Venter - Ventrianal shield subtriangular, reticulate; 118(115-120) long, 126(122-130) wide at the anterior corners; with 3 pairs of preanal setae, 3 pairs of lyrifissures (1 anterior to Jv1, 1 lateral and almost in line with Jv1 and 1 lateral and posterior to Zv1) and a pair of round pores mesad and slightly posterior to Jv2.

Spermatodactyl - T-shaped, shaft 12 long.

Legs - Sharp-tipped macroseta; St IV 60(58-62). Chaetotaxy of genua II and III same as in female.

LOCALITY AND TYPE MATERIAL - Holotype female, allotype male, 2 paratype females and 1 paratype male from *Andropogon gayanus*, Glazoue, Zou Province, **Benin**, 10-VI-1991, A. Onzo, deposited at ESALQ-USP; 3 paratype females and 2 paratype males from unknown plant, Atcherigbe, Zou Province, **Benin**, 10-X-1991, S. Dossou, deposited at IITAIM.

ETYMOLOGY - This new species is named after Alexis Onzo, a Beninese acarologist involved in the collections of most of the phytoseiids treated in this study.

REMARKS - *Neoseiulus teke* (Pritchard and Baker, 1962) resembles this new species, but differs by having all dorsal shield setae serrate, except j1 and J5 which are smooth, sternal shield reticulate, genital shield striate and calyx of spermatheca abruptly constricted near atrium. *Neoseiulus mebeloi* Zannou, Moraes and Oliveira **n. sp.** is also similar to this new species, but has mostly smooth dorsal shield with some lateral striae, dorsal shield setae shorter and spermathecal calyx shorter.

DISTRIBUTION - Benin.

Neoseiulus scapilatus (Van der Merwe)
(Fig. 20)

Amblyseius (*Amblyseius*) *scapilatus* Van der Merwe, 1965: 71.

Amblyseius scapilatus, Meyer and Rodrigues, 1966: 28.

Neoseiulus scapilatus, Chant and McMurtry, 2003: 37; Moraes *et al.*, 2004: 142.

Neoseiulus scapulatus [sic], McMurtry and Moraes, 1991: 26.

FEMALE - Ten specimens measured (Benin: 1; Burundi: 5; Kenya: 1; Malawi: 1; Rwanda: 1; Uganda: 1).

Dorsum - Dorsal shield 330(312-345) long, 192 (188-203) wide, smooth centrally and with dispersed striae laterally in region anterior to J2, striate in most region posterior to J2. Setae j1 20(18-23), j3 28(25-30), j4 17(14-19), j5 16(14-18), j6 16(14-18), J2 18(16-21), J5 13(10-19), z2 24(22-26), z4 27(24-30), z5 16(14-20), Z1 22(19-26), Z4 60(56-63) Z5 64(54-73), s4 43(38-46), S2 37(30-43), S4 29(23-33), S5 20(15-23), r3 23(20-28), R1 22(18-25). All setae smooth, except Z4 and Z5, serrate.

Peritreme - Extending to level of j1.

Venter - Sternal shield with scarce lateral striae, posterior margin slightly concave; distances between St1-St3 59(56-61), St2-St2 65(62-70). Genital shield smooth; distance between St5-St5 60(58-64). Ventrianal shield pentagonal, with transverse striae anterior to preanal pores and reticulate posteriorly, anterior margin almost straight, 117(110-125) long, 108(8100-128) wide at level of Zv2 and 90(83-95) wide at level of anus, with a pair of round pores mesad and slightly posterior to Jv2. Two pairs of metapodal shields. Caudoventral setae smooth and sharp-tipped.

Chelicera - Movable digit 32(31-33) long, with 1 tooth; fixed digit 28(28-29) long, with 4 teeth and a *pilus dentilis*.

Spermatheca - Calyx tubular, 31(30-35) long, constricted for almost 1/2 of its length, near atrium, which is nodular.

Legs - Sharp-tipped macrosetae; Sge IV 36(30-42), St IV 72(63-80). Chaetotaxy: genu II: 2-2/0,2/0-1; genu III 1-2/1,2/0-1.

SPECIMENS EXAMINED - Two females, **Benin**: Glazoue, Zou Province on, *Andropogon gayanus*, 10-VI-1991, A. Onzo. Seven females, **Burundi**: 5 km S Gitega, Rutana Province, on unknown plant, 13-XII-1989, J.S. Yaninek; 3 km N Minago, Butare Province, on *Setaria* sp., 14-XII-1989, J.S. Yaninek; 3 km E Makumba, Makumba Province, on *Erigeron floribundus*, 14-XII-1989, J.S. Yaninek. Two females, **Kenya**: Kakamega, Western Province, on *E. floribundus*, 03-XII-1989, J.S. Yaninek. One female, **Malawi**: 12 km SE Mzuzu, Northern Province, on *Pteridium aquilinum*, 01-VI-2002, I.D. Zannou. Two females, **Uganda**: 16 km E Bushenyo, Kakunyo Village, on unknown plant, 07-X-1990, J.S. Yaninek. Three females, **Rwanda**: 36 km W Gitarama, Kibuye Province on *Solanum aculeastrum*, 06-XII-1989, J.S. Yaninek.

REMARKS - Similar to the original description, 3 of the specimens from Burundi and the specimens from Benin and Malawi have R1 inserted on dorsal shield. However, in 2 of the specimens from Burundi and in the specimens from Kenya and Uganda, R1 is inserted on the integument surrounding the dorsal shield. The calyx of spermatheca of the specimens collected in this study is ca. 34% shorter and its constricted region is ca. 22% longer than reported in the original description.

DISTRIBUTION - Benin, Burundi, Kenya, Malawi, Mozambique, Reunion Island, Rwanda, South Africa, Uganda, and Zimbabwe.

Neoseiulus sehlabatei (El-Banhawy)

Amblyseius sehlabatei El-Banhawy, 2002: 189.

Neoseiulus sehlabatei, Chant and McMurtry, 2003: 23; Moraes *et al.*, 2004: 143.

REMARKS - This species was described from specimens collected from Sehlabathebe National Park (Qacha's Nek), Lesotho, on unknown plant. No additional specimens were collected in this study. The synonymy between this species and *N. krugeri* is discussed in the remarks section of the latter.

DISTRIBUTION - Lesotho.

Neoseiulus smithmeyerae Ueckermann, Moraes and Zannou **n. sp.** (Fig. 21)

DIAGNOSIS - This species is characterized by the combination of the following characters: spermatheca with a globular atrium and pocular calyx and genu II with 9 setae.

FEMALE - Three specimens measured.

Dorsum - Dorsal shield 363 (356- 369) long, 194 (195-198) wide, mostly reticulate. Setae j1 22 (22-23), j3

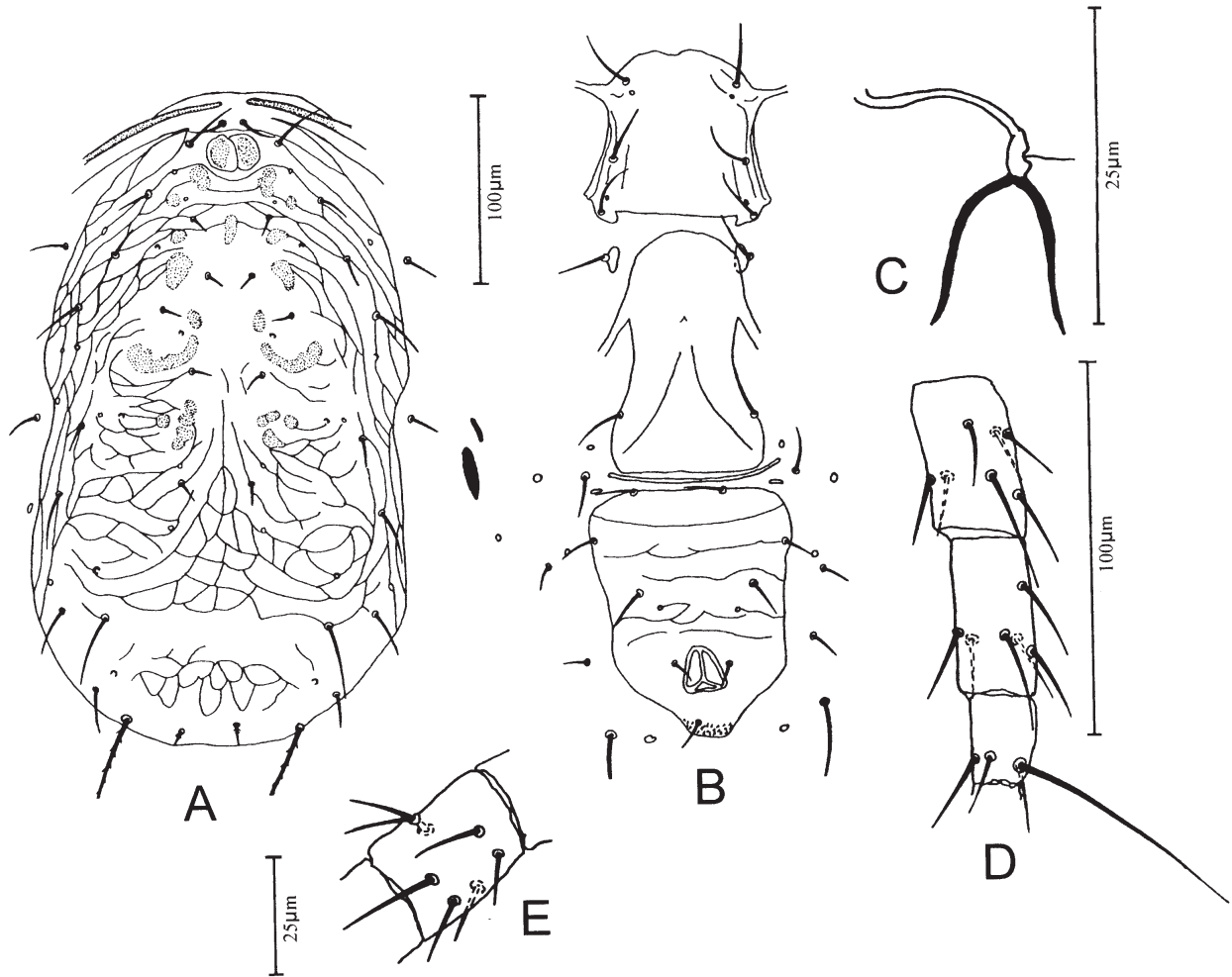


Fig. 21. *Neoseiulus smithmeyerae* Ueckermann, Moraes and Zannou n. sp. (female) - A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Leg IV; E. Genu of leg II.

30(28-32), j4 10(9-11), j5 10(9-11), j6 13, J2 13, J5 9, z2 20(19-22), z4 17(16-19), z5 10(9-11), Z1 19, Z4 41, Z5 69(67-73), s4 34(32-35), S2 33(32-35), S4 28, S5 26(25-28), r3 22, R1 20(19-22). All setae smooth except Z5, serrate.

Peritreme - Extending to level of j1.

Venter - Sternal shield smooth, posterior margin straight; distances between St1-St3 61(60-62), St2-St3 61(57-63). Genital shield smooth; distance between St5-St5 64(62-66). Ventrianal shield pentagonal and with transverse striae, anterior margin slightly convex, 125 (123-126) long and 98(98-99) wide at level of Zv2 and 86(82-91) at level of anus, with a pair of small and round preanal pores posteromesad to Jv2. Two pairs of metapodal shields. Caudoventral setae smooth and sharp-tipped.

Chelicera - Movable digit 30(28-32) long, apparently with 1 tooth; fixed digit 32 long, with at least 7-8 teeth and a *pilus dentilis*.

Spermatheca - Calyx pocular, 13 long; atrium globular.

Legs - Macrosetae pointed distally; Sge III 25, Sge IV 36(35-38), Sti IV 32, St IV 68(65-69). Chaetotaxy: genu II: 2-2/1,2/1- 1; Sge III: 1-2/1,2/0-1.

LOCALITY AND TYPE MATERIAL - Holotype female and two paratype females from *Leucosidea sericea*, Mkhomazi State Forest, southern Drakensberg Mountains, Kwazulu/Natal Province, **South Africa**, 19-I-1991, M.K.P. Smith Meyer, deposited in NCA-PPRI.

ETYMOLOGY - This species is named in honor of the late M.K.P. Smith Meyer, well-known South African Acarologist.

REMARKS - *Neoseiulus aridus* (De Leon, 1962) resembles this new species, but differs by having cup-shaped calyx of spermatheca with atrium apparently incorporated, no macroseta on genu III. De Leon (1962) did not refer to the leg chaetotaxy of *N. aridus* in the original description of this species. Chant and McMurtry (2003) mention the presence of 9 setae on genu II only in *Archeosetus rackae* (Fain, 1987) and *Phyllodromus leioides* (De Leon, 1959) in the subtribe Neoseiulini. It is

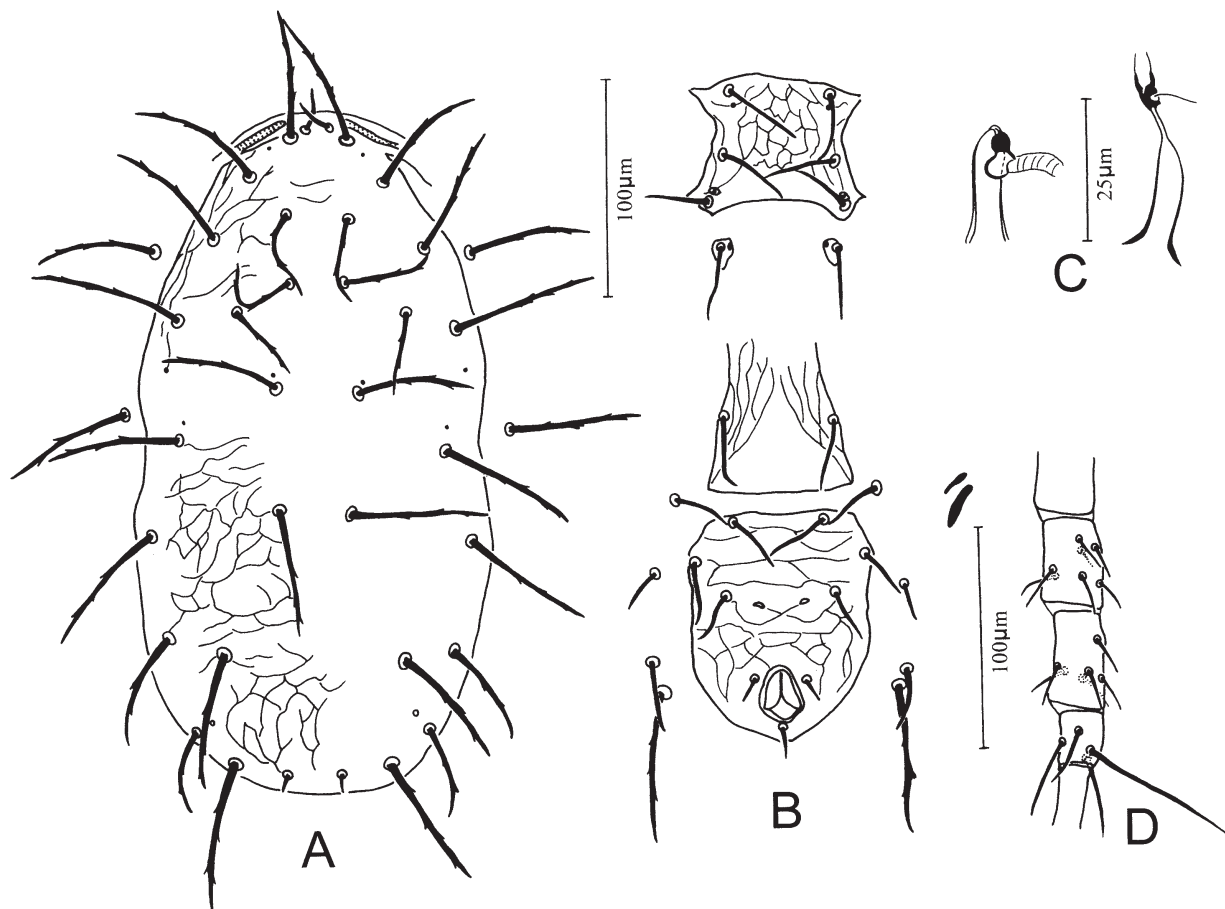


Fig. 22. *Neoseiulus teke* (Pritchard and Baker) (female) - A. Dorsal shield; B. Ventral surface; C. Spermatheca; D. Leg IV.

assumed in this paper that *N. aridus* has either 7 or 8 setae on genu II.

DISTRIBUTION - South Africa.

***Neoseiulus teke* (Pritchard and Baker)
(Fig. 22)**

Amblyseius (Amblyseius) teke Pritchard and Baker, 1962: 239.

Amblyseius teke, Meyer and Rodrigues, 1966: 30; Moraes *et al.*, 1989b: 83; Moraes *et al.*, 1989a: 97.

Neoseiulus teke, Chant and McMurtry, 2003: 37; Moraes *et al.*, 2004: 147.

Amblyseius (Amblyseius) bidens Karg, 1970: 293 (synonymy according to Ueckermann and Loots, 1988).

Amblyseius pseudolongispinosus Xin, Liang and Ke, 1981: 75 (synonymy according to Ueckermann and Loots, 1988).

FEMALE - Eleven specimens measured (Burundi: 1; Democratic Republic of Congo: holotype; Ghana: 2; Kenya: 3; Malawi: 1; Mozambique: 1; Rwanda: 1; Sierra-Leone: 1)

Dorsum - Dorsal shield 308(293-320) [348] long, 172(162-186) wide, with anterior half smooth centrally and with diagonal striae laterally; region between S2 and S5 reticulate, region posterior to S5 with undulating transverse striae. Setae j1 18(16-19), j3 44(35-50) [61], j4 30(23-36) [42], j5 42(35-48), j6 48(43-53) [60], J2 53(45-59) [68], J5 11(10-12), z2 49(41-54) [62], z4 51(43-56) [65], z5 29(19-38) [42], Z1 53(45-62) [65], Z4 60(54-67), Z5 65(59-74), s4 60(54-64) [71], S2 61(56-67), S4 43(40-48), S5 32(23-40) [48], r3 40(34-46) [61], R1 37(27-48) [66]. All setae serrate, except j1 and J5, smooth.

Peritreme - Extending to level between j1 and j3.

Venter - Sternal shield reticulate, posterior margin concave; distances between St1-St3 56(53-58), St2-St2 58(56-63). Genital shield longitudinally striate; distance between St5-St5 56(51-63). Ventrianal shield pentagonal, reticulate, anterior margin slightly concave, 111(104-118) [108] long, 97(93-102) [95] wide at level of Zv2 and 76(64-91) wide at level of anus, with a pair of elliptical pores mesad and slightly posterior to Jv2. Two pairs of metapodal shields. Caudiventral setae smooth and sharp-tipped, except Jv5 which is serrate.

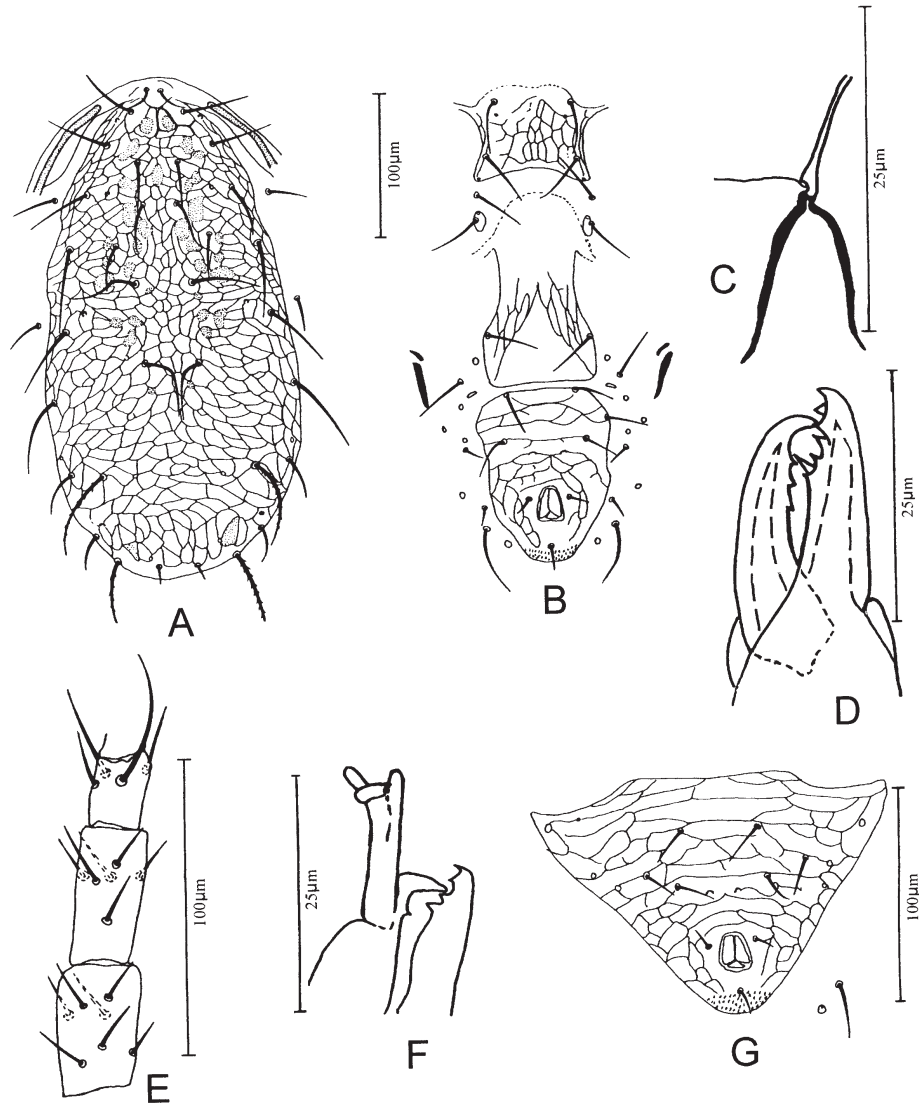


Fig. 23. *Neoseiulus tridenticus* Ueckermann, Moraes and Zannou **n. sp.** - A. Female dorsal shield; B. Female ventral surface; C. Spermatheca; D. Female chelicera, E. Female leg IV; F. Spermatodactyl; G. Male ventrianal shield.

Chelicera - Movable digit 26(25-27) long, with 2 teeth; fixed digit 24 (23-25) long, with 4 teeth and a *pilus dentilis*.

Spermatheca - Calyx tubular, 24(22-27) long with ca. 1/3 of its total length near atrium, slender; atrium forked.

Legs - Sharp-tipped macroseta; St IV 66(51-77) [72]. Chaetotaxy: genu II: 2-2/0,2/0-1; genu III: 1-2/1, 2/0-1.

SPECIMENS EXAMINED - Two females, **Burundi**: ISABU, Bujumbura, on unknown plant, 11-XII-1989, J.S. Yaninek. **Democratic Republic of Congo**: Holotype female from Kinshasa (= Leopoldville), Djoue, on grass, 12-IV-1955, E.W. Baker. Four females, **Ghana**: Somanya, on *Euphorbia heterophylla*, 13-XI-1989, J.S. Yaninek. Six females, **Kenya**: 13 km W Kwale, Coastal Province, on *Lycopersicon esculentum*, 29-XI-1989, J.S.

Yaninek; 3 km N Lunga Lunga, Coastal Province, on *Panicum* sp., 28-XI-1989, C.W. Kariuki. Two females, **Malawi**: 23.2 km NW Nkhata- Bay-Mzuzu junction, on *Manihot esculenta*, 02-V-2000, I.D. Zannou. Three females, **Mozambique**: 12.3 km N Xai-Xai, on *Cucurbita pepo*, 23-VI-1999, I.D. Zannou. Three females, **Rwanda**: ISAR Station, Rubona, on unknown plant, 06-XII-1989, J.S. Yaninek. One female, **Sierra-Leone**: Bo, China Farm, on *Centrosema* sp., 14-XII-1991, J.S. Yaninek.

REMARKS - The illustrations in this paper are of the holotype. The specimens examined in this study differ from the holotype in that the entire dorsal shield is distinctly reticulate. It seems possible that the less discernible reticulation of the holotype is due to mounting preparation and time it has been mounted on slides.

DISTRIBUTION - Burundi, China, Democratic Republic of Congo, Ghana, Germany, Kenya, Malawi, Mo-

zambique, Reunion Island, Rwanda, Sierra-Leone, South Africa, Tanzania, and Zimbabwe.

***Neoseiulus tridenticus* Ueckermann, Moraes and Zannou n. sp. (Fig. 23)**

DIAGNOSIS - This new species is characterized by having movable cheliceral digit with 3 teeth and peritreme extending to level of seta j3.

FEMALE - Six specimens measured.

Dorsum - Dorsal shield 353(343-359) long, 158 (154-161) wide, reticulate. Setae j1 20(19-2), j3 48(47-50), j4 38(37-41), j5 39(38-41), j6 49(47-51), J2 49 (47-50), J5 13, z2 44(42-44), z4 47, z5 32(32-33), Z1 51(47-54), Z4 63(63-66), Z5 67(63-72), s4 60(60-61), S2 58(54-61), S4 32(28-35), S5 29(28-32), r3 31(28-32), R1 31(28-32). All setae smooth, except Z4 and Z5, serrate.

Peritreme - Extending to level of j3.

Venter - Sternal shield reticulate, posterior margin concave; distances between St1-St3 58(54-63), St2-St2 32(30-35). Genital shield reticulate; distance between St5-St5 65(63-69). Ventrianal shield pentagonal, reticulate, anterior margin convex, 116(110-123) long and 89(88-91) wide at level of Zv2 and 76(77-79) at level of anus, with a pair of round preanal pores posteromesad to Jv2. One member of Zv2 is missing in the holotype. Two pairs of metapodal shields. Caudoventral setae smooth and sharp-tipped.

Chelicera - Movable digit 22(22-23) long, with 3 teeth; fixed digit 23(22-24) long, with 5 teeth and a *pilus dentilis*.

Spermatheca - Calyx bell-shaped, 14(13-16) long; atrium small and nodular.

Legs - Macroseta pointed distally; St IV 45(42-50). Chaetotaxy: genu II: 2-2/0,2/0- 1; genu III: 1-2/1,2/0-1.

MALE - One specimen measured.

Dorsum - Dorsal shield 284 long, 154 wide, shield pattern as in female. Setae j1 19, j3 5, j4 25, j5 25, j6 32, J2 33, J5 9, z2 32, z4 32, z5 20, Z1 35, Z4 44, Z5 47, s4 41, S2 38, S4 22, S5 19, r3 22, R1 19. All setae smooth, except Z4 and Z5, serrate.

Peritreme - Extending to a level between j3 and z2.

Venter - Ventrianal shield triangular, reticulate, 113 long and 158 wide at anterior corners; with 3 pairs of preanal setae, a pair of elliptical preanal pores posteromesad to Jv2, 2 pairs of lyrifissures lateral of Zv2.

Spermatodactyl - Shaft 16 long.

Legs - Macroseta pointed distally; St IV 32. Chaetotaxy of genua II and III same as in female.

LOCALITY AND TYPE MATERIAL - Holotype female, 5 paratype females and 1 paratype male from *Phaseolus vulgaris*, ICIPE, Nairobi, Kenya, 20-IX-1999, M. Kungu, deposited in NCA-PPRI.

ETYMOLOGY - The epithet *tridenticus* refers to the three teeth on the movable cheliceral digit.

REMARKS - This new species belongs to the *paloratus* species group (Chant and McMurtry 2003), characterized primarily by having St3 inserted off the sternal shield. It differs from all species in that group by having cheliceral movable digit with 3 teeth and peritreme extending to level of j3, instead of j1.

DISTRIBUTION - Kenya.

***Neoseiulus vanderlinde* (Van der Merwe) (Fig. 24)**

Amblyseius (Amblyseius) vanderlinde Van der Merwe, 1965: 73; Ueckermann and Loots, 1988: 153.

Neoseiulus vanderlinde, Chant and McMurtry, 2003: 37; Moraes *et al.*, 2004: 150.

FEMALE - Five specimens measured (South Africa: 5).

Dorsum - Dorsal shield 319(299-331) long, 172 (154-183) wide, mostly smooth, with a few anterolateral striae. Setae j1 14(13-16), j3 14(13-16), j4 9, j5 9, j6 9, J2 11(9-13), J5 9, z2 14(13-16), z4 13, z5 9, Z1 13, Z4 22, Z5 32, s4 16(13-19), S2 17(16-19), S4 14(13-16), S5 14(13-16), r3 15(13-16), R113. All setae smooth, Z5 smooth in some but serrate in other specimens.

Peritreme - Extending to base of j1.

Venter - Sternal shield with rare lateral striae, posterior margin concave; distances between St1-St3 55(54-60), St2-St2 57(55-60). Genital shield smooth; distance between St5-St5 52(47-57). Ventrianal shield pentagonal, with transverse striae anterior to Jv2 and irregular striae posterior to Jv2, anterior margin straight, 105(95-110) long and 90(79-101) wide at level of Zv2 and 73(66-88) at level of anus, with a pair of round preanal pores, posteromesad to Jv2. Two pairs of metapodal shields. Caudoventral setae smooth and sharp-tipped.

Chelicera - Movable digit 30(30-32) long, with 1 tooth; fixed digit 28(27-30) long, with 5 teeth and a *pilus dentilis*.

Spermatheca - Calyx trumpet-shaped, 24(22-28) long; atrium slightly forked.

Legs - Macrosetae pointed distally; Sge IV 33(32-35), St IV 55(50-60). Chaetotaxy: genu II: 2-2/0, 2/0- 1; genu III: 1-2/1,2/0-1.

MALE - Two specimens measured (South Africa: 2).

Dorsum - Dorsal shield 255(252-258) long, 161 (158-164) wide, shield pattern as in female. Setae j1 13, j3, j4 9, j5 9, j6 9, J2 9, J5 9, z2 11(9-13), z4 13, z5 9, Z1 11(9-13), Z4 15(14-16), Z5 21(19-22), s4 13, S2 13, S4 13, S5 9, r3 13, R1 11. All setae smooth.

Peritreme - Extending to base of j1.

Venter - Ventrianal shield subtriangular, reticulate; 104 long and 128(126-129) wide at anterior corners; with 6 pairs of preanal setae, a pair of pores, posteromesad to Jv2, lyrifissures not visible.

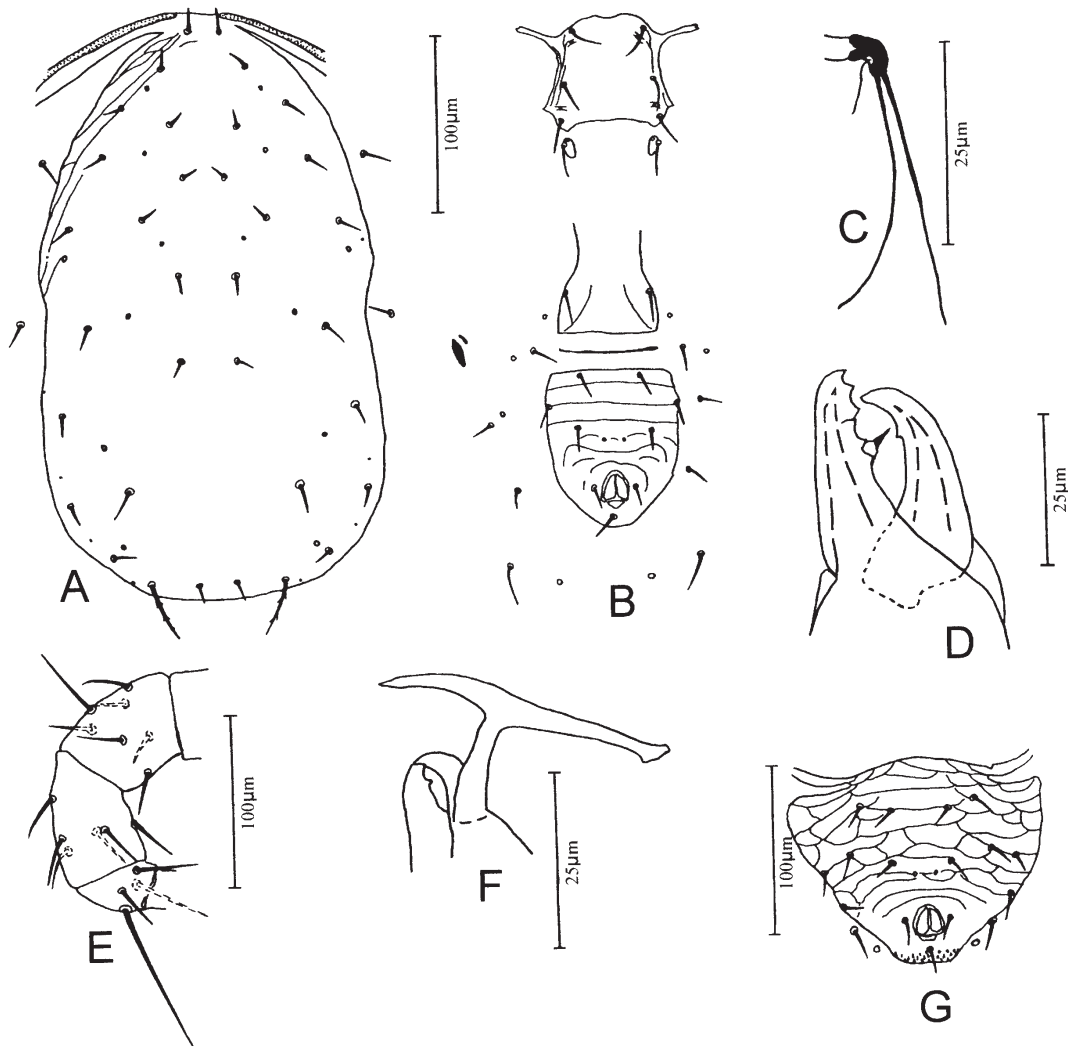


Fig. 24. *Neoseiulus vanderlindei* (Van der Merwe) - A. Female dorsal shield; B. Female ventral surface; C. Spermatheca; D. Female chelicera, E. Female leg IV; F. Spermatodactyl; G. Male ventrianal shield.

Spermatodactyl - T-shaped, shaft 13 long.

Legs - Macrosetae pointed distally; Sge IV 22(19-25), St IV 38(37-38). Chaetotaxy of genua II and III same as in female.

SPECIMENS EXAMINED - Seven females and four males, **South Africa**: Grabouw, Western Cape Province, from grass, 30-XII- 1954, P.A.J. Ryke; Yzerfontein, Western Cape Province, from *Arctotheca calendula*, 20-IX-1988, M.K.P. Smith Meyer; Gonubie Beach, Eastern Cape Province, from *Cyphostemma cirrhosum*, 9-II-1974, M.K.P. Smith Meyer; Golden Gate National Park, Free State Province, from *Senecio harveianus*, 11-II-1982, M.K.P. Smith Meyer.

DISTRIBUTION - South Africa.

***Neoseiulus yanineki* Zannou, Zundel, Hanna and Moraes**

Neoseiulus yanineki Zannou, Zundel, Hanna and Moraes, 2005: 56.

REMARKS - This species was described from specimens collected in Mankon village, Cameroon, on *Melinis minutiflora* (Poaceae). No additional specimens were collected in this study.

DISTRIBUTION - Cameroon.

Key to the species of genus *Neoseiulus* treated in this paper

1. Seta St3 off sternal shield.....*N. tridenticus* n. sp.
Seta St3 inserted on sternal shield.....2
2. Anterolateral setae (j3, z2 and z4) at least as long as distance between their bases and bases of respective immediate posterior setae.....3
Anterolateral setae (j3, z2 and z4) shorter than distance between their bases and bases of respective immediate posterior setae.....8
3. Dorsal setae, except j1 and J5 serrate; calyx of spermatheca abruptly constricted toward atrium.....
.....*N. teke* (Pritchard and Baker)

- Dorsal setae, except Z4 and/or Z5 smooth; calyx of spermatheca not abruptly constricted toward atrium4
4. Junction of atrium and major duct vacuolate.....5
Junction of atrium and major duct not vacuolate.....6
5. Seta Z1 longer than distance between its base and base of S2.....*N. onzoi* **n. sp.**
Seta Z1 shorter than distance between its base and base of S2.....*N. angolaensis* **n. sp.**
6. Dorsal shield mostly smooth, with few lateral striae...
.....*N. yanineki* Zannou, Zundel, Hanna and Moraes
Dorsal shield reticulate.....7
7. Sternal shield reticulate; genital shield smooth; fixed and movable cheliceral digits with 7 and 1 tooth, respectively.....*N. lamticus* (Athias-Henriot)
Sternal and genital shields striate; fixed and movable cheliceral digits with 8-9 and 3 teeth, respectively.....*N. knappi* **n. sp.**
8. Seta Z1 at least 0.6x as long as distance between its base and base of S2; S2 at least 0.8x as long as distance between its base and base of S4 9
Seta Z1 at most 0.5x as long as distance between its base and base of S2; S2 at most 0.6x as long as distance between its base and base of S4.....10
9. Seta Z1 approximately as long as distance between its base and base of S2; junction of atrium and major duct of spermatheca vacuolate.....*N. mebeloi* **n. sp.**
Seta Z1 ca. 0.6x as long as distance between its base and base of S2; junction of atrium and major duct of spermatheca nodular.....
.....*N. scapilatus* (Van der Merwe)
10. Dorsal shield smooth or mostly smooth, with some lateral striae.....11
Dorsal shield not as above.....19
11. Calyx of spermatheca cone-shaped.....
.....*N. conicus* **n. sp.**
Calyx of spermatheca not cone-shaped.....12
12. Calyx of spermatheca at least 10 times as long as width at its midlength.....13
Calyx of spermatheca at most 5 times as long as width at its midlength.....17
13. Seta Z4 shorter than distance between its base and bases of S4 and S5, respectively.....14
Seta Z4 longer than distance between its base and base of S4 and at least as long as distance between its base and the base of S5.....15
14. Seta j1 as long as j3; J2 ca. 0.35x as long as Z5.....
.....*N. vanderlindei* (Van der Merwe)
Seta j1 ca. 0.68x as long as j3; J2 ca. 0.55x as long as Z5.....*N. agrestis* (Karg)
15. Seta s4 ca. 0.46x as long as Z4 and ca. 0.40x as long as Z5; z4 ca. 0.86x as long as s4; dorsal shield mostly smooth, with lateral striae between j1 and S4.....
.....*N. ceratoni* (Ueckermann and Loots)
- Seta s4 at least 0.70x as long as Z4 and at least 0.55x as long as Z5; z4 at most 0.52x as long as s4; dorsal shield distinctly smooth.....16
16. Seta S4 ca. 0.25x as long as Z5 and ca. 0.50x as long as s4.....*N. makuwa* (Ehara)
Seta S4 ca. 0.40x as long as Z5 and ca. 0.70x as long as s4.....*N. liticellus* (Athias-Henriot)
17. Seta j5 ca. 0.56x as long as Z4 and 0.40x as long as Z5; atrium approximately as wide as width of calyx of spermatheca at its midlength.....
.....*N. calorai* (Corpuz-Raros and Rimando)
Seta j5 at most 0.43x as long as Z4 and at most 0.27x as long as Z5; atrium narrower than width of calyx of spermatheca at its midlength.....18
18. Side of calyx of spermatheca (where minor duct is located) straight, second side curved.....
.....*N. barkeri* Hughes
Sides of calyx of spermatheca not curved.....
.....*N. erugatus* (Van der Merwe and Ryke)
19. Calyx of spermatheca disc or cup-shaped; diameter of calyx of spermatheca at least double its length.....
.....20
Calyx of spermatheca not disc or cup-shaped; diameter of calyx of spermatheca at most 0.75x of its length23
20. Seta St4 off metasternal shield.....
.....*N. benjamini* (Schicha)
Seta St4 on metasternal shield.....21
21. Setae S4, S5 and Jv5 serrate; Z4 as long as distance between its base and base of S5.....
.....*N. asperisetatus* **n. sp.**
Setae S4, S5 and Jv5 smooth; Z4 shorter than distance between its base and base of S522
22. Seta Z4 ca. 0.3x as long as Z5; s4 ca. 0.20x as long as Z5; Z4 smooth; ventrianal shield quadrate.....
.....*N. baraki* (Athias-Henriot)
Seta Z4 ca. 0.50x as long as Z5; s4 ca. 0.40x as long as Z5; Z4 serrate; ventrianal shield pentagonal.....
.....*N. lula* (Pritchard and Baker)
23. Calyx of spermatheca distinctly constricted toward atrium.....24
Calyx of spermatheca not constricted toward atrium25
24. Seta j1 ca. 0.23x as long as Z5; movable cheliceral digit with 1 tooth; dorsal shield with anterior half smooth centrally and with diagonal striae laterally; region between S2 and S5 reticulate; region posterior to S5 with undulating transversal striae.....
.....*N. constricticervix* **n. sp.**
Seta j1 ca. 0.36x as long as Z5; movable cheliceral digit with 3 teeth; dorsal shield reticulate.....
.....*N. exiguus* (Van der Merwe)
25. Calyx of spermatheca tubular and bulged near atrium
.....*N. accessus* (Ueckermann and Loots)
Calyx of spermatheca not tubular26

26. Sternal shield distinctly reticulate.....27
Sternal shield mostly smooth, with scarce lateral striae
.....28
27. Setae S4, S5, and Jv5 serrate; Z4 much shorter than
distance between its base and the base of S5 and ca.
0.25x as long as Z5.....*N. coatesi* (Schultz)
Setae S4, S5, and Jv5 smooth; Z4 about as long as distance
between its base and base of S5 and ca. 0.40x
as long as Z5.....*N. neobaraki* n. sp.
28. Seta Z4 ca. 0.60x as long as Z5; 9 setae on genu II....
.....*N. smithmeyerae* n. sp.
Seta Z4 at most 0.50x as long as Z5; 8 setae on genu II
.....29
29. Genital shield smooth; calyx of spermatheca widening
uniformly from atrium to vesicle.....
.....*N. krugeri* (Van der Merwe)
Genital shield reticulate; calyx of spermatheca widening
abruptly near vesicle.....
.....*N. sehlabatei* (El-Banhawy)

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