Five new species of phytoseiid mites (Acari: Mesostigmata) from southwest Madagascar

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INTRODUCTION

During screening activities for spider mite eating predator mites in Madagascar a number of new species was found. This paper concerns some of the species of the genera Amblyseius Berlese, 1914 and Typhlodromus Scheuten, 1857 subgenus Anthoseius De Leon, 1959, which were also chosen for a cytogenetic study (Blommers & Blommers, in prep.).

The nomenclature of the dorsal setae is that proposed by Lindquist & Evans (1965) and adapted for Phytoseiidae by Athias-Henriot (1966).

Holotypes and paratypes will be deposited in the Institute of Taxonomic Zoology (Zoologisch Museum) of the University of Amsterdam, paratypes also in the Muséum National d'Histoire Naturelle, Paris.

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Typhlodromus (Anthoseius) gutierrezi
sp. n. (figs. 1-7)

Material studied: - Holotype ♀ (the author's serial no. B50. 1-3) and 10 paratypes (7 ♂♂ and 3 ♀♀) from Ricinus communis (Euphorbiaceae), Miary near Tuléar, 13.IV.1971 (L. Blommers).

Differential diagnosis.- T. gutierrezi resembles T. paganus Van der Merwe, 1968 and T. vesicus Van der Merwe, 1968, both from South Africa. It differs from the first species in the form of the sperma-
theca and the size of the macrosetae on leg IV; and from the second also in the lack of a knobbed macroseta on leg III. Most of the dorsal setae of both African species are longer.

Description.- Female: Dorsal shield strongly imbricated, with pronounced sigilla (=imprints of muscle attachment) 330 μ long and 200 μ wide. At least 17 pairs of pores. 18 pairs of stout setae; length in microns: j1 22, j3 25, j4 15, j5 20, j6 22, j2 23, j5 11, z4 22, z5 21, z4 30, z5 45, z2 19, z3 22, s4 24, s6 24, S2 25, S4 25, S5 17. 24 and 25 serrated, the latter with blunt and hyaline tip: remaining setae smooth and pointed. r2 and R1, both 18 μ, on the interscutal membrane. Peritremes ending in front of setae j1.

Sternal and genital shield smooth. Ventri-anal shield 110 μ long and 90 μ wide, with four pairs of pre-anal setae. Surrounding membrane with four pairs of setae and six pairs of pores. Ventro-caudal pair (VL1) 31 μ long.

Leg IV with three macrosetae, all three distinctly capitale: on genu 13 μ long, on tibia 17 μ and on basitarsus 25 μ. Remaining legs without macrosetae.

Fixed digit of chelicera 24 μ long, with four subapical teeth. Movable digit 24 μ long, with three teeth.

Major duct of spermatheca very small (1-2 μ). Atrium bulbous, 7 μ long and 4 μ wide. Cervix bell-shaped, 9 μ wide.

Male: r2 and R1 on dorsal shield. Length of setae (in microns): j1 17, j3 20, j4 15, j5 15, j6 16, j2 17, j5 9, z4 18, z5 15, z4 24, z5 35, s2 15, s3 17, s4 19, s6 19, s2 20, z4 18, z5 10, r2 15, R1 15. 24 and 25 serrated, 25 blunt, all remaining setae smooth.

Ventri-anal shield fused with peritremal shields, 100 μ long. Four pairs of pre-anals, six pairs of pores. Surrounding membrane with VL1 13 μ long and two pairs of pores.

Leg IV with three macrosetae: on genu 11 μ, on tibia 13 μ and on basitarsus 12 μ.

Fixed digit of chelicera 15 μ long, with three subapical teeth. Movable digit 14 μ long, with one tooth; spermatophoral process linear and 23 μ long, with pointed end 5 μ.

**Typhlodromus (Anthoseius) chazeaui** sp. n. (figs. 8-11)

Material studied.- Holotype 9 (author's serial no. B6-3) and 14 paratypes (13 99 and 1 d) from *Grewia* sp. (Tiliaceae), Ifaty near Tuléar, 9.VI. 1971 (L. Blommers).

Differential diagnosis.- *T. gutierrezi* is similar to *T. chazeaui*, but it differs from the latter in the size of the macroseta on genu IV, the form of the spermatheca and the spermatophoral process.

Description.- Female: Dorsal shield rather strongly imbricated: 300 μ long and 190 μ wide. Length of the setae (in microns): j1 19, j3 24, j4 18, j5 19, j6 22, j2 23, j5 10, z4 22, z5 20, z4 34, z5 47, s2 19, s3 21, s4 25, s6 25, S2 27, S4 27, S5 19, r2 20, R1 22. 24 and 25 faintly serrated, the latter with a blunt and hyaline tip; the remainder stout, smooth and pointed. Peritremes ending in front of setae j1.

Venter as with *T. gutierrezi* (fig. 5); ventri-anal shield 100 μ long and 80 μ wide. VL1 37 μ long.

Macrosetae on leg IV: length in microns: genu 7, tibia 17, basitarsus 28.

Fixed digit of chelicera 28 μ long, with four teeth; movable digit 25 μ, with three teeth.

Major duct of spermatheca not distinct from atrium, all together 5 μ long. Cervix vase-shaped, 11 μ long and 5 μ wide.

Male: r2 and R1 on dorsal shield. Length of setae (in microns): j1 15, j3 16, j4 14, j5 15, j6 14, j2 16, j5 10, z4 14, z5 14, z4 25, z5 37, s2 13, s3 17, s4 17, s6 16, S2 18, S4 16, S5 12, r2 14, R1 14. 24 and 25 serrated; 25 blunt ending.

Venter as in *T. gutierrezi* (fig. 7); ventri-anal shield 100 μ long, VL1 17 μ.

Length of macrosetae on leg IV (in microns): genu 5, tibia 14, basitarsus 21.

Fixed digit of chelicera 16 μ long, with three teeth. Movable digit 17 μ long, with one tooth; spermatophoral process linear, 18 μ long, with narrow and knobbed end 3 μ long.

Remarks.- *T. gutierrezi* and *T. chazeaui* seem to be closely related to several species of the sub-
genus *Anthoseius* known from Africa and Asia; all have three knobbed macrosetae on leg IV, setae 24 and 25 serrated and the latter with a blunt end. But, since the descriptions of most of these species are rather superficial, we have restricted the differential diagnosis to the species extensively described by Van der Merwe (1968).

*Amblyseius (Amblyseius) bibens* sp. n. (figs. 12-18)

Material studied.— Holotype ♀ (author's serial no. 39/28) and 8 paratypes (7 ♀♀ and 1 ♂) from Cordon popaya (Cariaceae), Institut de Recherches pour le Coton et le Textile (I.R.C.T.) experimental station, Tuléar, 3.III.1971 (L. Blommers). Other paratypes: ♀ (8♂♀/1♂) from *Hibiscus esculentus* (Malvaceae), 25.III.1971, ♀ (6♂♀/2♂) and ♂ (5♀/1♂) from *Corchorus trilocularis* (Tiliaceae), III.1971, and 2 ♀♀ and 3 ♂♂ (5♀/1♂) from unidentifiable plant, 9.III.1971, all in the Agricultural Garden in Tuléar (L. Blommers).

Differential diagnosis.— *A. bibens* resembles *A. teke* Fritschard & Baker, 1962 in many respects. Compared to the redescriptions of this African species by Van der Merwe (1968), practically all the dorsal setae of *A. bibens* are of inferior length, and faintly serrated (instead of smooth).

Description.— Female: Dorsal shield entirely imbricated, 340μ long and 200μ wide. With at least 20 pairs of pores. 17 pairs of setae on shield; length in microns: j1 20, j3 30, j4 30, j5 45, j6 54, j7 65, j5 50, z4 54, z5 25, z1 55, z4 66, z5 76, z6 56, s4 66, s2 70, s4 66, s5 40. All setae except for j1 and j5 faintly serrated. The serration is rather fine, and therefore not indicated in the figure). No setae of dorsal series reaching the base of consecutive one. Setae r2 and r1 on the interscutal membrane, 50 and 48μ long. Peritremal shield fused anteriorly with dorsal shield. Peritremes reaching base of setae j3.

Sternal and genital shield imbricated and normal. Ventral-anal shield also imbricated, 125μ long and 100μ wide. Three pairs of approximately equidistant pre-anal setae. Four pairs of setae and seven pairs of pores surrounding ventral-anal shield. VLI serrated, 64μ long.

Only a macroseta on genu IV, 75μ long.

Fixed digit of chelicera 24μ long, with three teeth; movable digit 26μ long, with two teeth.

Major duct of spermatheca thin walled and broad, 19μ long and 3μ wide. Bifid atrium 9μ long. Oervix 24μ long, with initial 7μ constricted; its maximal width 7μ.

Male: Length dorsal shield 260μ, width 170μ. r2 and R1 on dorsal shield. Length of setae (in microns): j1 15, j3 34, j4 18, j5 28, j6 30, j2 35, j5 9, z4 38, z5 15, z1 37, z4 42, z5 50, z2 32, s4 45, s2 45, s4 27, s5 25, r2 30, R1 24.

j1, j5 and z5 not serrated.

Ventre-anal shield not fused with peritremal shields, 115μ long; with three pairs of pre-anal setae and five pairs of pores. Surrounding membrane with VLI 33μ long and three pairs of pores.

Macroseta on genu IV 5μ long.

Fixed digit of chelicera 19μ long, with two teeth. Movable digit 19μ long, with one tooth; T-shaped spermatophoral process, major portion 12μ long, branches 15 + 7 μ.

*Amblyseius (Amblyseius) rotundus* sp. n. (figs. 19-25)

Material studied.— Holotype ♀ (author's serial no. 850. 2♂♀) and 6 paratypes (4 ♀♀ and 2 ♂♂) from *Hibiscus communis* (Euphorbiaceae), Miary near Tuléar, 13.VI.1971 (L. Blommers).

Differential diagnosis.— *A. rotundus* resembles *A. ovalis* (Evans, 1953), but it differs from the latter in the length of the macrosetae on leg IV, the shape of the ventral-anal shield and the form of the spermatheca in the ♀ (as determined and illustrated by Bhar, 1967).

Description.— Female: Dorsal shield feebly sclerotized, reticulate anterodorsally, with at least 19 pairs of pores; 350μ long and 250μ wide. 17 pairs of setae; length in microns: j1 34, j3 22, j4 8, j5 7, j6 8, j2 10, j5 7, z4 11, z5 8, z1 10, z4 12, z5 43, s2 9, s4 15, s2 14, s4 15, s5 15. Slightly serrated. Setae r2 and R1 on interscutal membrane, both 12μ long. Peritremes not reaching in front of setae j3.

Sternal shield not clearly visible in our specimens. Ventral-anal shield 100μ long and 75μ wide, with three pairs of pre-anal setae. Surrounding membrane with four pairs of pores and
four pairs of setae; VL1 30 μ long.

Length of legs (femur-tarsus): leg I 330μ, leg II 260μ, leg III 275μ and leg IV 365μ. Three macrosetae on leg IV: on genu 65μ long, on tibia 45μ and on the basitarsus 80μ.

Fixed digit (length 23μ) of chelicera with three subapical teeth. Movable digit (length 24μ) with one small tooth.

Major duct of spermatheca hardly visible; atrium elongate, somewhat bent, 6μ long. Cervix long and slender, 25μ long, narrowing over last 3/5th of its length.

Male: Dorsal shield hardly reticulate. r2 and R1 on dorsal shield. Length of setae (in microns): j1 25, j3 30, j4 7, j5 6, j6 7, j2 9, j5 5, z4 10, z5 5, z1 9, z4 9, z5 42, s2 8, s4 16, s2 13, s4 14, s5 17, r2 13, R1 10. Z5 slightly serrated.

Ventral-anal shield fused with peritremal shields, 100μ long. Four pairs of pre-anals, four pairs of pores. Two pairs of pores in surrounding membrane; VL1 29μ long.

Length of tarsi (including basitarus): leg I 95μ, leg II 85μ, leg III 85μ, leg IV 120μ. Macrosetae on leg IV: on genu 45μ, on tibia 38μ, on basitarsus 60μ.

Fixed digit of chelicera 20 μ long, with one pronounced subapical tooth. Movable digit 19μ long, with one small tooth; spermatophoral process linear, terminally pointed, 25μ long.

Amblyseius (Amblyseius) brevipes
sp. n. (figs. 26-28)

Material studied.— Holotype 9 (author’s serial no. 46/9) and 5 paratypes (3 99 and 2 de) from Carica papaya (Caricaceae), Tuléar, 13.IV.1970 (J. Gutierrez). Other paratypes: 8 99 from Carica papaya, Tuléar, 3.III.1971 (L. Blommers) and 2 99 from Diospyros sp. (Ebenaceae), Manombo, 50 km N. of Tuléar, 16.V.1971 (L. Blommers).

Differential diagnosis.— A. brevipes is similar to A. rotundus except for the length of some setae on leg IV and the dorsal shield, the length of the legs and the shape of the spermatheca and the spermatophoral process.

Description.— Female: Dorsal shield as in A. rotundus (fig. 23), 340μ long and 220μ wide.

Length of setae (in microns): j1 34, j3 25, j4 9, j5 8, j6 10, j2 11, j5 6, z4 13, z5 10, z1 10, z4 13, z5 47, s2 12, s4 24, s2 14, s4 14, s5 15, r2 17, R1 10.

Sternal shield not clearly visible; genital shield normal. Ventral-anal shield 100μ long and 75μ wide. Pores and setae as in A. rotundus (fig. 20). VL1 32μ long.

Length of legs: leg I 270μ, leg II 215μ, leg III 225μ and leg IV 310μ. Three macrosetae on leg IV: on genu 45μ long, on tibia 42μ, on basitarsus 72μ.

Fixed digit of chelicera (length 22μ) with three teeth; movable digit (length 24μ) with one.

Major duct of spermatheca not visible; atrium 6μ long. Cervix slender, 26μ long, from 8-18μ constricted.

Male: Dorsal shield reticulate laterally; r2 and R1 on it. Length of setae (in microns): j1 25, j3 28, j4 8, j5 8, j6 9, j2 10, j5 6, z4 15, z5 7, z1 11, z4 11, z5 40, s2 12, s4 22, s2 11, s4 14, s5 15, r2 15, R1 10. Z5 somewhat serrated.

Ventral-anal shield fused with peritremal shields, 100μ long. Four pairs of pre-anals, four pairs of pores. Two pairs of pores in surrounding membrane; VL1 25μ.

Length of tarsi: leg I 80μ, leg II 75μ, leg III 75μ, leg IV 110μ. Macrosetae on leg IV: on genu 32μ, on tibia 36μ and on basitarsus 62μ.

Fixed digit of chelicera 19μ long, with one tooth. Movable digit 19μ long, with one tooth; spermatophoral process linear, knobbed at end, 22μ long.

Remarks.— Both A. rotundus and A. brevipes agree with the original, but superficial description of A. ovalis from Indonesia. Several workers have mentioned the occurrence of this species over great parts of south-eastern Asia, but only Ebara (1967) has described his specimens in sufficient detail. Since our specimens do not compare with the A. ovalis of Okinawa Island, we prefer to describe them as new, while our discovery of two so closely related forms seems to indicate that A. ovalis in South East Asia may stand for more than one species.
REFERENCES


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Figs. 1-7 Typhlodromus gutierrezi sp. n. 1-5: 1, dorsum; 2, leg IV; 3, chelicera; 4, spermatheca; 5, venter.
6-7: 6, chelicera; 7, ventral-anal shield.
Figs. 8-11 *Typhlodromus chazeaui* sp. n. 8-10: 8, leg IV; 9, chelicera; 10, spermatheca. 11: d. chelicera.

Figs. 12-15 *Amblyseius bibens* sp. n. 9, 12, spermatheca; 13, dorsum; 14, leg IV; 15, chelicera.
Figs. 16-18  Amblyseius bibens sp. n. 16, venter; 17, ventri-anal shield, d; 18, chelicera, d.
Figs. 19-22  Amblyseius rotundus sp. n., 19, spermatheca; 20, venter; 21, chelicera; 22, leg IV.
Figs. 23-25 *Amblyseius rotundus* sp. n. 23, dorsum, ♀; 24, chelicera, ♂; 25, ventro-anal shield, ♂.

Figs. 26-28 *Amblyseius brevipes* sp. n. 26, leg IV, ♀; 27, spermatheca, ♀; 28, chelicera, ♂.