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New Phytoseiidae (Acari: Mesostigmata) of Mascareignes and Comoros Archipelagos (Indian Ocean): one new record, three new species groups and description of six new species and of six unknown males

Serge Kreiter, Rose-My Payet, Reham Abo-Shnaf, Martial Douin

Original research

ABSTRACT

Faunas of Phytoseiidae of the Mascareignes Archipelago (Réunion, Mauritius and Rodrigues Islands) and of the Comoros Archipelago (Mayotte, Anjouan, Mohéli and Grande Comore Islands) were recently investigated by authors of this paper and results were published in seven already published papers. We described in this eighth paper six species new to science and six unknown males collected during these surveys.

Keywords taxonomy; systematics; predatory mites; survey; Paragigagnatus philippei Kreiter n. sp.; Amblyseius erici Kreiter n. sp.; Typhlodromalus baillodi Kreiter n. sp.; Ueckermannseius gutierrezi Kreiter n. sp.; Ueckermannseius jean-mariei Kreiter n. sp.; Ueckermannseius payetae Kreiter n. sp.

Zoobank http://zoobank.org/3D9E2C62-029D-48FD-AD63-210635DFF2FD

Introduction

Mites of family Phytoseiidae are all predatory species on phytophagous mites and small insects like thrips and whiteflies, on commercial plants and the wild vegetation, many of these arthropods being important pests for agriculture. Several species are biological control agents for the control of these pest organisms in both open and protected crops all around the world (McMurtry and Croft 1997; McMurtry et al. 2013; Knapp et al. 2018).

This family is widespread around the world, present on all continents except Antarctica, and consists of about 2,521 valid species in 95 genera, 15 tribes and three subfamilies (Demite et al. 2021).

Despite several interests of this family and its large distribution, many areas of the world are very poorly investigated or not investigated, some areas remaining white spots concerning the fauna of Phytoseiidae.

Thus, biodiversity surveys in these poorly investigated areas are still an urgent need and might result in the discovery of additional species potentially useful for biological control as
well as having more information on the biodiversity of these areas for biodiversity practical purposes.

In these perspectives, the more interesting areas are probably those with a high level of biodiversity. Most of the Indian Ocean constitutes one of the highest world biodiversity areas, those areas called hotspots, concept defined by Myers (1988) in order to identify the most immediately important areas for biodiversity conservation. The common characteristics of these hotspots are that they hold high endemism levels and have lost at least 70% of their original natural vegetation (Myers et al. 2000). Knowledge of the phytoseiid diversity in these high interest areas in the context of global climate changes may contribute to identify potential biological control agents (BCAs) and future establishment of conservation programs.

Several Islands are located in the Indian Ocean, especially in two archipelagos, Mascareignes and Comoros. The former is constituted of several small Islands and three main Islands: La Réunion, Mauritius and Rodrigues. The later is constituted of some small Islands and four main Islands: Mayotte, Anjouan, Mohéli and Grande Comore.

Although these Islands, especially Mascareignes Islands, are a top destination for tourism and attracted the interest of many European naturalists, the fauna of phytoseiid mites remains poorly known (Ferragut and Baumann 2019). These main Islands of the two Archipelagos (except La Réunion which was investigated before, see Kreiter et al. 2020b) were investigated from October 25th to December 12th, 2018. Results of Phytoseiidae records were already published in six papers; Kreiter and Abo-Shnaf 2020a, b for Rodrigues and Mauritius (in addition to Mauritius, see Kreiter et al. 2018a; Kreiter et al. 2020a, 2021b, c, d for Mayotte, Anjouan, Mohéli, and Grande Comore (in addition to Grande Comore, see Kreiter et al. 2018b), respectively.

This paper aims to give the description of six species new to science and six unknown males along with one new record collected during this survey.

Material and Methods

The survey took place during 2018 in: Mauritius (October 27th – November 6th), Rodrigues (November 8th – November 16th), Mayotte (November 23rd – November 27th), Anjouan (November 28th – December 1st), Mohéli (December 1st – December 5th) and Grande Comore (December 5th – December 11th).

Mites were directly collected on leaves with a fine brush with or without a pocket lens or a stereo-microscope when available (large leaves and herbaceous plants) or by beating the plants (mainly shrubs and trees with very small or spiny leaves) and collecting the mites in a black plastic rectangular saucer 45 x 30 cm (Ref. STR 45, BHR, 71370 Saint-Germain-du-Plain, France). Collected mites were then transferred with a fine brush into small plastic vials containing 1.5 ml of 70% ethanol.

The mites were then all slide-mounted in Hoyer’s medium (Walter and Krantz 2009), the slides were dried at 45-50°C for at least two weeks and then all examined and identified using a phase and interferential contrast microscope (DMLB, Leica Microsystems SAS, Nanterre, France). Characters of specimens were measured using a Leica graded eyepiece.

Chant and McMurtry’s (1994, 2007) concepts of the taxonomy of the family Phytoseiidae for identification and the world catalogue database of Demite et al. (2014, 2021) for distribution and information on descriptions and re-descriptions were used. The setal nomenclature system adopted was that of Lindquist and Evans (1965) and Lindquist (1994) as adapted by Rowell et al. (1978) and Chant and Yoshida-Shaul (1989) for the dorsal surface and by Chant and Yoshida-Shaul (1991) for the ventral surface. Pore (= solenostome) and poroid (= lyrifissure) notations are that of Athias-Henriot (1975). Macrosetal notation (Sge = genual macroseta; Sti = tibial macroseta; St = tarsal macroseta) are that of Muma and Denmark (1970). Numbers of teeth on the fixed and movable cheliceral digits do not include the respective apical teeth. Setae not referred to in results section should be considered as absent. All measurements are given

Kreiter S. et al. (2021), Acarologia 61(4): 845-889. https://doi.org/10.24349/Krky-e23s
in micrometres (µm) and presented with the mean in bold followed by the range in parenthesis. Type of spermaphor or insemination apparatus is that of Denmark and Evans (2011).

Classification of plants follows the APG IV classification of 2016 (ex. Byng et al. 2018).

Specimens of each species are deposited in the mite collections of Institut Agro (Montpellier SupAgro) conserved in UMR CBGP INRAE/IRD/CIRAD/SupAgro/University of Montpellier.

The following abbreviations are used in Tables (1–3) for morphological characters: n = number of individuals measured; dsl = dorsal shield length just above j1 to just below J5 in the mid line; dsw = dorsal shield width at the level of s4; Peritreme = level of the peritreme extension; gd = number of solenostomes; gensl = genital shield length; gensw st5 = genital shield width at level of setae st5; gensw post. cor. = genital shield width at level of posterior corners; lisl = primary or largest inguinal sigilla (= “primary metapodal plate”) length; lisw = primary or largest inguinal sigilla (= “primary metapodal plate”) width; sisl = secondary or smallest inguinal sigilla (= “secondary metapodal plate”) length; vsl = ventrianal shield length; gv3-gv3 = distance between centres of each solenostome gv3 on the ventrianal shield; vsw ZV2 & vsw anus = ventrianal shield width at ZV2 level and at para-anal setae level; scl: largest calyx length; scw = calyx widest width; Fdl = fixed digit length; Mdl = movable digit length; Nb teeth Fd = number of teeth on the fixed digit; Nb teeth Md = number of teeth on the movable digit; Shaft = length of the shaft of spermadactyl; branch = length of the branch; BCA = Biological Control Agent; aasl = altitude above sea level; imm. = immature.

The following abbreviations are used in this paper for institutions: CBGP = Centre de Biologie pour la Gestion des Populations; CIRAD = Centre International de Recherche Agronomique pour le Développement; IA = Institut Agro; INRAE = Institut National de Recherche pour l’Agriculture, l’Alimentation et l’Environnement; IRD = Institut de Recherche pour le Développement; MSA = Montpellier SupAgro, France; UMR = Unité Mixte de Recherche; UR = Unité de Recherche.

Results and Discussion

During the survey in Indian Ocean Islands, we found six new species to science and other six unknown males and one new record (in the chronological order of the survey: Mauritius, Rodrigues, Mayotte, Anjouan, Mohéli, and Grande Comore):

- One unknown male of Amblyseius haleakalus Prasad and one new record of Typhlodromips culmulus (van der Merwe) in Mauritius Island,
- One unknown male of Typhlodromus (Anthoseius) lobatus Zannou, Moraes and Oliveira in Mauritius and Rodrigues Islands,
- One new species of Ueckermannseius n. sp. 3 (different from the one in Mohéli and the one in Grande Comore Islands, see below) in Mayotte Island,
- One unknown male of Typhlodromus (Anthoseius) hartlandrowei Evans in Anjouan Island,
- One new species of Typhlodromalus, one unknown male of Amblyseius parasundii Blommers and one unknown male of Typhlodromus (Anthoseius) grewiae Zannou, Moraes & Oliveira in Mayotte and Mohéli Islands,
- One new species of Ueckermannseius n. sp. 1 (different from the one in Mayotte and the one in Grande Comore Islands, see below) and one new species of Paragigagnathus in Mohéli Island,
- One new species of each of Amblyseius and Ueckermannseius n. sp. 2 (different from the one in Mayotte and the one in Mohéli Islands, see below) in Grande Comore Island,
• One unknown male of *Amblyseius duplicesetus* Moraes & McMurtry in Mayotte, Mohéli and Grande Comore Islands.

These six new species and the six unknown males are all described and the new record mentioned thereafter.

Data follow the classification order of Chant and McMurtry (2007) and therefore the following taxonomical order: *Paragigagnathus* n. sp., *Amblyseius* n. sp. 1, *Typhlodromips culmulus* new record, *Amblyseius* n. sp. 2, unknown males of three species of *Amblyseius*, *Typhlodromalus* n. sp., new species groups of *Ueckermannseius*, *Ueckermannseius* n. sp. 1, *Ueckermannseius* n. sp. 2, *Ueckermannseius* n. sp. 3, unknown males of three species of *Typhlodromus* (Anthoseius).

**Subfamily Amblyseiinae Muma**

Amblyseiinae Muma 1961: 273.

**Tribe Neoseiulini Chant & McMurtry**

Neoseiulini Chant & McMurtry 2003: 6.

**Genus *Paragigagnathus* Amitai & Grinberg**

*Paragigagnathus* Amitai & Grinberg 1971: 327; Chant & McMurtry 2003: 39; Moraes et al. 2004b: 158.

**Paragigagnathus philippei** Kreiter n. sp.

Zoobank: 752EFED1-2498-4470-96FB-68C530C2C10E

**Classification.** *Paragigagnathus philippei* Kreiter n. sp. belongs to:

• the subfamily Amblyseiinae Muma (absence of dorsolateral setae z3 and s6 and the caudoventral seta JV3),

• to the tribe Neoseiulini Chant & McMurtry (seta S4 present, ratio s4/Z1 < 3.0, setae s4, Z4 and Z5 not greatly longer than other dorsal setae, usually slightly sclerotized, never with wide sternal shield, seta J2 always present),

• to the genus *Paragigagnathus* Amitai & Grinberg (female ventrianal shield reduced and/or markedly wider at the level of anus, with a prominent waist, chelicerae with teeth only on apical region, fixed digit with one to three teeth, movable digit with a single tooth, primary metapodal plate or unguinal sigillum elongate (Chant and McMurtry 2007). There are 12 species within this genus,

• Seta st3 is inserted off sternal shield of female on separate platelets (see below), which allows to classify this new species in the species group *strunkhovae* (Chant and McMurtry 2003). This species group contains four species (Chant and McMurtry 2003). The following list of characters of this new species is very different of all species of the genus and the species group. Despite the fact that we collected a single specimen, we consider this very original specimen as belonging to a new original species to science and we describe it thereafter.

**Description of adult female** (n = 1, Figs. 1 a-e)

*Dorsum* (Fig. 1a) – Dorsal shield 285 long and 158 wide at level of s4, totally ornamented and reticulate, except on the posterior lateral margin from level of s4 to level of Z5 with less ornamentations and reticulations, with five solenostomes difficult to ascertain because of ornamentations and reticulations (gd1, gd2, gd4, gd8 and gd9), only six pairs of poroids
Figure 1  Holotype female of *Paragigagnathus philippei* Kreiter n. sp. – a. Dorsal shield, b. Ventral shields, c. Chelicera, d. Spermatheca, d. Genu, tibia and basitarsus of leg IV.
difficult to see because of ornamentations and reticulations of the dorsal shield and possible to detect mainly on lateral sides, 17 pairs of dorsal setae and two pairs of sub-lateral setae on the membrane: j1 20, j3 28, j5 16, j4 16, j6 14, j3 19, J2 30, J5 10, s2 28, s4 30, s5 15, Z1 28, Z4 45, Z5 40, s4 38, s2 33, S4 26, S3 18, r3 20, R1 15. All setae thick, plumose and serrate, except for r3 and R1 thick and smooth.

Peritreme and peritremal plate (Fig. 1a) – Extending to level of j1; peritremal plate fused with dorsal shield at level between j1 and j3.

Venter (Fig. 1b) – All ventral shields smooth. Sternal shield with two pairs of setae (st1 and st2) and a pair of poroids (iv1; two pairs of setae (st3 and st4) on two separate metasternal plates (no discernible pores on both of them); posterior margin of the sternal shield apparently straight; a pair of poroids (iv2) off sternal shield. Distances st1-st1 40, st2-st2 46, st3-st3 64, st1-st3 53, st4-st4 82. Genital shield length 108, width at level of st5 58, width at level of posterior corners 58, distance st5-st5 54. Two pairs of metapodal plates, primary metapodal plate moderately long compared to some other species (Table 1), 29 long and 3 wide and secondary short, 6 long and 2 wide. Ventrianal shield 93 long, 55 wide at level of anterior corners (ZV2), and 56 wide at level of para-anal setae. Ventrianal shield with three pairs of pre-anal setae (JV1, JV2 and ZV2), and a pair of small crateriform gv3, 13 apart. Unsclerotized cuticle around ventrianal shield with four pairs of setae (JV4, JV5, ZV1 and ZV3), and apparently five pairs of round to oblong poroids difficult to see on our preparation, except for ivp on posterior part of the ventrianal shield. Seta JV5 short, thick and probably smooth (impossible to confirm on the single specimen), 12 long.

Chelicerae (Fig. 1c) – Fixed digit 20 long, with three strong teeth; and movable digit 20 long, with one strong tooth. Pilus dentilis not visible.

Spermatheca (Fig. 1d) – Pocular, 4 in length, with strong atrium at the basis of the calyx.

Legs (Fig. 1e) – Macrosetae are present on all legs and thick. Pointed thick macrosetae on genu I-III, tibia III, basitarsus, tibia and genu IV. Measurements: Sge1 14, SgeII 10, SgeIII 9, StIII 12, SgeIV 10, StIV 10, StIV 12. Genua II and III with seven and six setae, respectively. Chaetotactic formula of genu II: 2-2/0, 2/0-1; genu III: 1-2/0, 2/0-1.

Male. Unknown.

Material examined. A single ♀ in total collected during this study. One ♀ as type material.

MOHELI ISLAND: Bangoma, top of the village (42 m asl, 12°17’15” S, 43°43’40” E), 1 ♀ on Dendrocnide moroides (Weddell) Chew (Urticaceae), 4/XII/2018.

Type material. The holotype female is deposited in Institut Agro (Montpellier SupAgro) – INRAE Acarology collection, Montpellier, France.

Etymology. The name “philippei” refers to the first name of the senior author’s second brother, Philippe Luc Kreiter, Engineer-Researcher in INRAE and specialist of biological control of mealybugs. The species is named in his honour.

Differential diagnosis and remarks. This species is unique in the genus Paragigagnathus by a set of unique characters (Table 1) and especially the small size of the body, the setae all plumose, thick and serrate, the reduce size of metapodal plates, the reduce size of ventrianal shield and the occurrence of macrosetae on all legs, the sternal shield with only two setae, along with an assemblage of specific setae lengths. No other species are closed to the new species, especially within the strunkhovae species group to which this new species belongs. For this reason, this species is described despite the single specimen collected. New surveys on Mohéli Island must occur in order to recover the species and to increase the description. Paragigagnathus philippei Kreiter n. sp. is the 13th species of the genus Paragigagnathus and the fifth species of the strunkhovae species group (the eight other species belonging to the desertorum species group).

Tribe Typhlodromipsini Chant & McMurtry

Typhlodromipsini Chant & McMurtry 2005c: 318.
**Genus *Typhlodromips* De Leon**

*Typhlodromips* De Leon 1965: 23; Chant & McMurtry 2007: 61.

**Typhlodromips culmus (Van der Merwe)**

*Amblyseius (Amblyseius) culmus* van der Merwe 1968: 132; Ueckermann & Loots 1988: 157.

*Typhlodromips culmus*, Moraes et al. 1986: 139, 2004b: 210; Chant & McMurtry 2005c: 327, 2007: 61.

### Table 1: Comparison of characters of the 12 species of *Paragigagnathus* with those of *Paragigagnathus philippi* Kreiter n. sp.

| Character | *Typhlodromips* culmus (Van der Merwe) | *Paragigagnathus philippi* Kreiter n. sp. |
|-----------|-----------------------------------------|------------------------------------------|
| shape of setae | thick, pointed | thick, serrate |
| p | 1 | 2 |
| k | 3 | 4 |
| j | 5 | 6 |
| h | 7 | 8 |
| g | 9 | 10 |
| f | 11 | 12 |
| e | 13 | 14 |
| d | 15 | 16 |
| c | 17 | 18 |
| b | 19 | 20 |
| a | 21 | 22 |

*Note:* The species of the *Amblyseius* group within the genus *Amblyseius* are listed in the table. The second line of the table provides the number of characters of each species.

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*Source:* Kreiter S. et al. (2021), *Acarologia* 61(4): 845-889. https://doi.org/10.24349/Krky-e23s

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*Edited by:* [Your Name] 2023
This species belongs to the *culmulus* species group of the genus *Typhlodromips* with nine other species. It is also probably a type III species (McMurtry and Croft 1997; McMurtry *et al.* 2013), i.e., a polyphagous generalist predator. However, its biology remains totally unknown. It was already recorded on Mauritius Island, but only one record based on a single female and a single location (Kreiter *et al.* 2018a). It was also recorded in La Réunion Island, but with few specimens collected after intensive surveys (Kreiter *et al.* 2020b). This species seems rather rare.

Specimens examined. Two ♀♀ collected during this study. MAURITIUS ISLAND: Mare aux Vacoas (581 m aasl, 20°22'05" S, 57°29'31" E.), 2 ♀♀ on *Ludwigia octovalvis* (Jacquin) Raven (Onagraceae), 5/XI/2018.

Previous Records. Kenya, Lesotho, South Africa.

Remarks. Measurements of the two adult female specimens agree very well with measurements of the literature, with only very slight differences in the Mauritius specimen: smaller Z4, JV5, SgeII and StiV setae.

**Tribe Amblyseiini Muma**

Amblyseiinae Muma 1961: 273 and Amblyseiini Muma, Wainstein 1962: 26.

**Subtribe Amblyseiina Muma**

Amblyseiina Muma, Chant & McMurtry 2004: 179.

**Genus Amblyseius Berlese**

*Amblyseius* Berlese 1914: 143.

**Amblyseius erici** Kreiter *n.* sp.

Zoobank: F011832D-AFE5-45B2-BA60-BB9DA7E6A20

Classification. *Amblyseius erici* Kreiter *n.* sp. belongs to:

- the subfamily Amblyseiinae (absence of dorsolateral setae z3 and s6 and the caudoventral setae JV3),

- to the tribe Amblyseiini (setae j3, s4, Z4 and Z5 longer than other setae, ratio s4/Z1 > 3.1, many teeth on the fixed cheliceral digit and macrosetae on legs I, II and/or III in addition to macrosetae on leg IV),

- to the subtribe Amblyseiina (sternal shield as long as wide, ventrianal shield longer than wide, seta J2 present, genital shield almost as wide as ventrianal shield, ventral shields generally smooth, macrosetae on all legs, setae j5, J2, S2, S4, S5 and Z1 present),

- to the genus *Amblyseius* (ratio s4/S2 > 3.0, chelicerae of normal size with fixed digit of the same size as movable digit, seta JV2 present, without incision in lateral margin of dorsal shield at level of s4, ventrianal shield not reduced to a simple anal shield, Ge III and Ti III each generally with a macroseta) (Chant and McMurtry 2007),

- to the species group *obtusus* as setae J2 and Z1 are present, dorso-central setae and setae z2, z4, Z1, S2, S4, and S5 are minute, setae s4, Z4 and Z5 are prominent, elongate and whip-like, female ventrianal shield usually pentagonal, as wide at level of anus than at level of ZV2 or wider at this later level (Chant and McMurtry 2004),

- to the large species subgroup *andersoni* with the calyx bell- to glass-shaped. This subgroup contains 120 species (in Chant and McMurtry 2004). Many of those species are very different from the new species and we compare it thereafter with closer related species.
Figure 2  Holotype female of *Amblyseius erici* Kreiter n. sp. – a. Dorsal shield, b. Ventral shields, c. Chelicera, d. Spermatheca, e. Genu, tibia and basitarsus of leg IV.
**Description of adult female (n = 2, Figs. 2 a-e)**

**Dorsum** (Fig. 2a) – Dorsal shield smooth, 330–338 long and 195–200 wide at level of s4, with **seven** solenostomes (gd1, gd2, gd4, gd5, gd6, gd8 and gd9), **eight** pairs of poroids visible, lateral ones hidden, 17 pairs of dorsal setae and two pairs of sub-lateral setae on membranes: j1 22–28, j3 38–39, j4 7, j5 4–5, j6 7, j2 6, j5 6, z2 9, z4 10–11, z5 4–5, Z1 6–8, Z4 108, Z5 113–125, s4 88–93, S2 8, S4 8, S5 8, r3 20–22, R1 7–8; r3 and R1 apparently on the dorsal shield, but actually off on the unciliated cuticle. All setae smooth, except for Z4 and Z5 lightly serrate.

**Peritreme and peritremal plate** (Fig. 2a) – Extending to level of j1; peritremal plate fused with dorsal shield at level of j3.

**Venter** (Fig. 2b) – All ventral shields smooth. Sternal shield with three pairs of setae (st1-st3) and two pairs of poroids (iv1 and iv2); a pair of st4 and a pair of pores on a small pear-shaped metametasternal plate; posterior margin of the sternal shield concave. Distances st1-st1 58–59, st2-st2 65–68, st3-st3 68–70, st1-st3 63–65, st4-st4 65–66. Genital shield length 118–120, width at level of st5 70, width at level of posterior corners 60–70, distance st5-st5 63–65. Two pairs of metapodal plates, the primary 20 long and 4–5 wide and the secondary 12–13 long and 2 wide. Ventrianal shield 110–120 long, 83 wide at level of anterior corners (ZV2), and 75–77 wide at level of para-anal setae. Ventrianal shield with three pairs of pre-anal setae (JV1, JV2 and ZV2), and a pair of large crateriform gv3, 20 apart. Unscerotized cuticle around ventrianal shield with four pairs of setae (JV4, JV5, ZV1, and ZV3), and five pairs of round to oblong poroids not well discernible. Seta JV5 smooth, 73–75 long.

**Chelicerae** (Fig. 2c) – Fixed digit 30–31 long, with **ten** strong teeth; and movable digit 32–33 long, with **four** strong teeth. *Pilus dentilis* not visible.

**Spermatheca** (Fig. 2d) – Bell- to glass-shape, with a calyx swollen basally 12–13 long and 7–8 wide, an undifferentiated atrium and long major duct. Small minor duct not visible.

**Legs** (Fig. 2e) – Pointed strong and very visible whip-like macrosetae on genu I–III, on tibia III, and on basitarsus, tibia and genu IV. Measurements: Sgel 45–53, SgeII 35–38, SgeIII 31–35, StilIII 22–28, SgelIV 70–75, StilIV 50–55, StilV 80–84. Genua II and III both with **seven** setae. Chaetotactic formula of genua II: 2-2/0, 2/0-1; genu III: 1-2/1, 2/0-1.

**Description of adult male (n = 1)** (Figs. 3 a-d)

**Dorsum** (Fig. 3a) – Dorsal shield smooth, 250 long and 158 wide, with **seven** solenostomes (gd1, gd2, gd4, gd5, gd6, gd8 and gd9), **six** pairs of poroids, 19 pairs of dorsal setae (r3 and R1 on dorsal shield): j1 23, j3 34, j4 5, j5 3, j6 6, j2 5, j5 5, z2 7, z4 9, z5 5, Z1 5, Z4 78, Z5 108, s4 65, S2 8, S4 7, S5 6, r3 15, R1 8. All setae similar to adult female.

**Peritreme and peritremal plate** (Fig. 3a) – Extending to level of j1; peritremal plate fused with dorsal shield at level of j1.

**Venter** (Fig. 3b) – Sternogenital shield smooth. Distances st1-st1 48, st2-st2 53, st3-st3 50, st1-st5 105, st4-st4 40, st5-st5 30, with three pairs of poroids (iv1-iv3). Ventrianal shield 105 long, 128 wide at anterior corners and 50 wide at level of para-anal setae. Ventrianal shield reticulate anteriad JV1 with three pairs of pre-anal setae (JV1, JV2 and ZV2) and a pair of small crateriform gv3, between JV2 bases, 14 apart. Two pairs of poroids ivo discernible. Unscerotized cuticle arround ventrianal shield with a pair of seta (JV5). Seta JV5 smooth, 38 long.

**Chelicerae** (Fig. 3c) – Fixed digit 20 long, with **nine** teeth discernible; and movable digit 20 long, with **two** teeth discernible. Spermatodactyl shaft 19 and branch 5.

**Legs** (Fig. 3d) – One macroseta on legs I and II, two macrosetae on leg III and three macrosetae on legs IV similar to adult female. All macrosetae sharp-tipped. Measurements: Sgel 33, SgeII 30, SgeIII 23, StilII 18, SgeIV 50, StilIV 43, StilV 78. Chaetotactic formula of genua II and III similar to adult female.

**Specimens examined and measured**. Two ♀♀ and one ♂ collected during this study measured and type material. **GRANDE COMORE ISLAND: Mvouni**, University of Comoros (434 m aasl, 11°43′31″ S, 43°16′31″ E), 1 ♀ and 1 ♂ on *Clidemia hirta* L. (Melastomataceae),
Figure 3 Paratype male of *Amblyseius erici* Kreiter n. sp. — a. Dorsal shield, b. Ventral shields, c. Spermatodactyl, d. Genu, tibia and basitarsus of leg IV.
6/XII/2018; Ivembeni, Banda Samlini (791 m asl, 11°29′22″ S, 43°19′36″ E), 1 ♀ on Rubus rosifolius Smith (Rosaceae), 7/XII/2018.

**Type material.** One holotype ♀ on one slide, one paratype ♀ and one paratype ♂ on another slide are deposited in Institut Agro (Montpellier SupAgro) – INRAE Acarology collection, Montpellier, France.

**Etymology.** The name “erici” refers to the first name of the senior author’s youngest and third brother, Eric Kreiter. The species is named in his honour.

**Differential diagnosis and remarks.** None of the females of species of Amblyseius (of the obtusus species group and of the andersoni species subgroup) included in Table 2 share similar characters with females of Amblyseius erici Kreiter n. sp. The two closest species concerning setae length are A. angulatus Karg and A. compositus Denmark & Muma, but several other details are different: macrosetae lengths and number of teeth of these two species compared to the new species. But descriptions of these two new species are old and very poor and lacking information for a complete description. The shape of the spermatheca of the new species is unique and allows distinguishing this new species from all others in Table 2 and all species of the andersoni species subgroup. The following combination of characters, of the male indicated in the description of the male of this new species, is quite similar to that of the few described males of species of Amblyseius belonging to the obtusus species group and to the andersoni species subgroup.

Not many characters allow to distinguish it from all males of other species if no females are collected at the same time: the peritreme reaching the level of j1, an absence of reticulation of the dorsal shield, some dorsal setae lengths, especially z2, z4, r3 and S2 approximately of the same length (12–15), additional macrosetae on all other legs than leg IV, macrosetae of leg IV not subequal, a sternogenital shield smooth, ventrianal shield reticulate, only three pairs of pre-anal setae, a pair of crateriform gv3 between JV2. All described males of the large species subgroup andersoni have similar ventrianal shield reticulate with three pairs of pre-anal setae. Only the shape of the spermatodactyl allows distinction of the male of the specie (Figure 3c).

**Amblyseius duplicesetus Moraes & McMurtry**

Amblyseius duplicesetus Moraes & McMurtry 1988: 13; Moraes et al. 2004a: 143, 2004b: 22; Zannou et al. 2007: 10; El-Banhawy & Knapp 2011: 25.

Amblyseius duplicesetus [sic], Chant & McMurtry 2004: 208, 2007: 78.

**Description of adult male of Amblyseius duplicesetus** Moraes & McMurtry (n = 10, five from Anjouan, three from Mohéli and two from Grande Comore Islands, Figs 4 a-d)

**Dorsum** (Fig. 4a) – Dorsal shield smooth, 271 (262–295) long and 174 (150–193) wide, with seven solenostomes (gd1, gd2, gd4, gd5, gd6, gd8 and gd9) similar to adult female, seven pairs of poroids visible, but probably more present, 19 pairs of dorsal setae (r3 and R1 on dorsal shield); j1 31 (29–33), j3 44 (43–45), j4 8 (6–8), j5 5 (5–6), j6 8 (7–8), J2 9 (8–10), J5 8 (8–9), z2 9 (8–10), z4 9 (8–10), z5 5 (5–6), Z1 9 (8–11), Z4 61 (56–70), Z5 218 (200–238), s4 68 (63–73), S2 11 (10–12), S4 10 (9–11), S5 8 (7–9), r3 10 (8–13), R1 11 (9–14). All setae sharp-tipped and smooth, except for Z4 and Z5 lightly serrate.

**Peritreme and peritremal plate** (Fig. 4a) – Extending to level of j1 insertion; peritremal plate fused with dorsal shield at level between j1 and j3.

**Venter** (Fig. 4b) – Sternogenital shield smooth with only few striae in the anterior part and lateral margings, with five pairs of setae (st1-st5) and two pairs of poroids (iv1 and iv2). Distances st1-st1 52 (50–55), st2-st2 55 (50–58), st3-st3 55 (51–58), st1-st5 114 (112–118), st4-st4 36 (31–40), st5-st5 31 (30–34). Ventrianal shield 112 (108–118) long, 148 (138–158) wide at anterior corners and 59 (50–75) wide at level of para-anal setae. Ventrianal shield anteriorly reticulate (before the line constituted by JV2), with three pairs of pre-anal setae (JV1, JV2 and ZV2) and a pair of small crateriform gv3, between JV2 just below the line between their bases, 22 (20–25) apart. Shield also with a pair of iv3 and three pairs of poroids ivo. Unsclerotized cuticle arround ventrianal shield with a pair of seta (JV5). Seta JV5 smooth, 38 (34–45) long.
Table 2: Comparison of characters of females of nine species of the genus *Amblyseius* belonging to the *obtusus* species group and of the *andersoni* species subgroup in comparison with those of *Amblyseius erici* Kreiter n. sp.

| n   | Ddl | Dow | Denmark & Muma 1989 | Denmark & Muma 1989 | Denmark & Muma 1989 | Denmark & Muma 1989 | Denmark & Muma 1989 | Denmark & Muma 1989 | Denmark & Muma 1989 | Denmark & Muma 1989 |
|-----|-----|-----|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| 1   | 1   | 1   | 1                   | 1                   | 1                   | 1                   | 1                   | 1                   | 1                   | 1                   |
| 10  | 10  | 10  | 10                  | 10                  | 10                  | 10                  | 10                  | 10                  | 10                  | 10                  |

| Peritreme | j2-j3, close j1 | j3 | j2-j3, close j1 | j1 | j1 | j1 | j1 | j1 | j1 |
|-----------|-----------------|----|-----------------|----|----|----|----|----|----|
| gd        | ?               | ?  | ?               | ?  | ?  | ?  | ?  | ?  | ?  |
| j1        | 28              | 28 | 25              | 25 | 30 | 28 | 28 | 29 | 25 |
| j3        | 55              | 55 | 40-45           | 35 | 38 | 50 | 50 | 55 | 50 |
| j4        | 9               | 9  | 3               | 9  | 8  | 4  | 10 | 8  | 10 |
| j5        | 8               | 8  | 3               | 8  | 8  | 4  | 8  | 5  | 5  |
| j6        | 11              | 11 | 5               | 5  | 8  | 6  | 13 | 8  | 10 |
| j12       | 8               | 6  | 5               | 5  | 9  | 6  | 13 | 8  | 6  |
| j5        | 8               | 7  | 4               | 5  | 10 | 12 | 10 | 10 | 10 |
| r3        | 25              | 18 | 16              | 19 | 33 | 19 | 19 | 24 | 23 |
| R1        | 14              | 8  | 4               | 8  | 20 | 12 | 15 | 13 | 7  |
| s4        | 75              | 68 | 62-72           | 83 | 85 | 78 | 75 | 83 | 78 |
| S2        | 18              | 11 | 7               | 6  | 8  | 9  | 15 | 18 | 17 |
| S4        | 10              | 8  | 5               | 6  | 9  | 9  | 10 | 11 | 10 |
| S5        | 9               | 5  | 5               | 6  | 8  | 8  | 10 | 10 | 10 |
| S2        | 13              | 10 | 9               | 11 | 8  | 20 | 15 | 15 | 15 |
| z4        | 29              | 21 | 20              | 9  | 9  | 19 | 15 | 15 | 15 |
| z5        | 6               | 5  | 6               | 5  | 6  | 4  | 8  | 5  | 5  |
| Z1        | 11              | 11 | 6               | 6  | 6  | 13 | 10 | 10 | 10 |
| Z4        | 68              | 95 | 68              | 86 | 83 | 90 | 78 | 76 | 80 |
| Z5        | 134             | 113| 85-90           | 104| 115| 157| 150| 113| 108|

| JV5       | –               | –  | –               | –  | –  | –  | –  | –  | –  |
| Sgl       | –               | –  | –               | –  | –  | –  | –  | –  | –  |
| SglI      | –               | –  | –               | –  | –  | –  | –  | –  | –  |
| SglII     | –               | –  | –               | –  | –  | –  | –  | –  | –  |
| SglIII    | –               | –  | –               | –  | –  | –  | –  | –  | –  |
| StI       | –               | –  | –               | –  | –  | –  | –  | –  | –  |
| StI       | –               | –  | –               | –  | –  | –  | –  | –  | –  |
| StIV      | 70              | 80 | 47              | 58 | 68 | 66 | 65 | 64 | 60 |
| StIV      | 55              | 52 | 36              | 55 | 55 | 56 | 55 | 43 | 40 |
| StIV      | 75              | 74 | 65              | 76 | 73 | 74 | 75 | 64 | 63 |
| sul       | 7               | 8  | 8               | 5  | 11 | 11 | 10 | 12 | 12 |
| scw       | –               | –  | –               | –  | –  | –  | –  | –  | –  |
| Fdl       | –               | –  | –               | –  | –  | –  | –  | –  | –  |
| No teeth Fdl | 9          | 9  | 9               | 9  | 11 | 9  | 8  | 9  | 10 |
| MdII      | –               | –  | –               | –  | –  | –  | –  | –  | –  |
| No teeth MdII | 3          | 3  | 3               | 3  | 1  | 2  | 3  | 3  | 4  |

In each upper box of the first line, the first name is the name of the species (for example *andersoni*), the second line: name(s) is name(s) of describer(s) (for example Chant for *andersoni*) and the third line is the source of measurements (for example Denmark & Muma 1989 for *andersoni*).
Figure 4 Paratype male of *Amblyseius duplicesetus* Moraes & McMurtry – a. Dorsal shield, b. Ventral shields, c. Spermatodactyl, d. Genu, tibia and basitarsus of leg IV.
Chelicerae (Fig. 4c) – Fixed digit 23 (21–24) long, with eight teeth; and movable digit 23 (21–25) long, with one tooth. Spermatodactyl shaft 18 (14–20) and branch 8 (8–9). Pilus dentilis not visible.

Legs (Fig. 4d) – All legs with macrosetae sharp-tipped. Measurements: Sgel 36 (33–40), SgelII 31 (28–33), SgelIII 38 (30–38), StiIV 90 (90–100), StiIV 75 (68–85), StiV 55 (50–58). Chaetotactic formula of genua II and III similar to adult female.

Specimens examined. Twenty-three ♂♂ collected during this study, 10 ♂♂ measured, 13 ♂♂ as complementary voucher material. ANJOUAN ISLAND (5 ♂♂): Chandra, inside the village (436 m aasl, 12°12′36″ S, 44°27′09″ E), 1 ♂ on Acalypha wilkesiana Müller Argoviensis (Euphorbiaceae), 29/XI/2018; Pomoni, exit of the village (29 m aasl, 12°17′01″ S, 44°34′37″ E), 1 ♂ on Artocarpus heterophyllus Lamarck (Moraceae), 1 ♂ on Artocarpus altilis (Parkinson) Fosberg (Moraceae) and 2 ♂♂ on an unknown tree with alternate leaves, 30/XI/2018. MOHELI ISLAND (11 ♂♂): Fomboni, inside the town (15 m aasl, 12°17′29″ S, 43°44′35″ E), 1 ♂ on Annona muricata L. (Annonaceae), 2/XII/2018; Fomboni, Les-Hauts (60 m aasl, 12°17′29″ S, 43°44′35″ E), 2 ♂♂ on an unknown host plant, 2/XII/2018; Hoani, inside village (38 m aasl, 12°17′3″ S, 43°44′34″ E), 1 ♂ on the same unknown host plant than above, 1 ♂ on A. muricata L., 1 ♂ on Annona muricata L. (Annonaceae), 2/XII/2018; Fomboni, Les-Hauts (60 m aasl, 12°17′29″ S, 43°44′35″ E), 2 ♂♂ on an unknown host plant, 2/XII/2018; Bangoma, Les-Hauts (137 m aasl, 12°17′18″ S, 43°43′41″ E), 1 ♂ on Cinnamomum odoratum Schäffer (Lauraceae), 1 ♂ on A. altilis and 1 ♂ on Persea americana Miller (Lauraceae), 4/XII/2018. GRANDE COMORE ISLAND (7 ♂♂): Mdé, INRAPE (51 m aasl, 11°44′12″ S, 43°14′59″ E), 1 ♂ on Mangifera indica L. (Anacardiaceae), 6/XII/2018; Mvouni, University of Comoros (343 m aasl, 11°43′11″ S, 43°16′31″ E), 1 ♂ on Myristica fragrans Houttuyn (Myristicaceae) and 1 ♂ on Citrus sinensis (L.) Osbeck (Rutaceae), 6/XII/2018; Dzahani, village (209 m aasl, 11°46′32″ S, 43°16′40″ E), 1 ♂ on Carica papaya L. (Caricaceae), 1 ♂ on Artocarpus altilis Parkinson Fosberg (Moraceae), 7/XII/2018; Mdjoiyezi (230 m aasl, 11°50′19″ S, 43°18′29″ E), 1 ♂ on M. indica, 10/XII/2018; Mdé, INRAPE (51 m aasl, 11°44′12″ S, 43°14′59″ E), 1 ♂ on Spondias dulcis Solander ex. Parkinson (Anacardiaceae), 11/XII/2018.

Voucher material. Twenty-three ♂♂ on 20 slides are deposited in Institut Agro (Montpellier SupAgro) – INRAE Acarology collection, Montpellier, France.

Differential diagnosis and remarks. The male of this species was mentioned in El-Banhawy and Knapp (2011), but it is not indicated that this is the first mention of the male of this species, the male was illustrated, but the description lacks detail (El-Banhawy and Knapp 2011). We thus decide on a more detailed description of the male of this species.

This species belongs to the largoensis species group as setae J2 and Z1 are present, seta s4 is minute and the ventrianal shield of the female is vase-shaped. It belongs to the largoensis species subgroup as seta Z4 is long, spermatheca has the calyx elongate mostly tubular and the female ventrianal shield is entire (Chant and McMurtry 2004).

The following combination of characters, indicated in the description of the male of this species, is quite similar to the few described males of species of Amblyseius belonging to the largoensis species group and to the largoensis species subgroup.

Not many characters allow to distinguish it from all males of other species if no females are collected in the same time (all the males used for description were collected with females of this species): the peritreme reaching level of j1, absence of reticulation of the dorsal shield, all dorsal setae including J5 length approximately of the same length (8–11), except for j1, j3, s4, Z4, Z5 longer and z5 shorter, additional macrosetae on all other legs than leg IV, macrosetae of leg IV not sub-equal, a sternogenital shield mostly smooth, a ventrianal shield reticulate, only three pairs of pre-anal setae, a pair of crateriform gv3 between JV2.

All described males of the large species subgroup largoensis have very similar ventrianal shield reticulate with three pairs of pre-anal setae.
**Amblyseius haleakalus Prasad**

*Amblyseius haleakalus* Prasad 1968: 1516; Moraes *et al.* 1986: 14, 2004b: 27; Denmark & Muma 1989: 97; Chant & McMurtry 2004: 199, 2007: 78.

*Amblyseius (Multiseius) haleakalus*, Denmark & Evans 2011: 75.

**Description of adult male of *Amblyseius haleakalus* Prasad** (n = 1, Figs 5 a-d)

*Dorsum* (Fig. 5a) – Dorsal shield smooth, 300 long and 193 wide, with seven solenostomes (gd1, gd2, gd4, gd5, gd6, gd8 and gd9), seven pairs of poroids visible, 19 pairs of dorsal setae (r3 and R1 on dorsal shield): j1 33, j3 33, j4 4, j5 4, j6 8, j2 8, j5 5, z2 8, z4 9, z5 6, Z1 8, Z4 85, Z5 (half-broken), s4 80, S2 10, S4 9, S5 8, r3 8, R1 8. All setae smooth, except for Z4 lightly serrate and Z5 probably slightly serrate, but not all visible because both members of Z5 are damaged.

*Peritreme and peritremal plate* (Fig. 5a) – Extending to level of j1; peritremal plate fused with dorsal shield at level of z2.

*Venter* (Fig. 5b) – Sternogenital shield smooth with only few striae, five pairs of setae (st1-st5) and two pairs of poroids (iv1 and iv2). Distances st1-st1 54, st2-st2 61, st3-st3 60, st1-st5 117, st4-st4 48, st5-st5 38. Ventrianal shield 140 long, 148 wide at anterior corners and 75 wide at level of para-anal setae. Ventrianal shield reticulate with three pairs of pre-anal setae (JV1, JV2 and ZY2), and a pair of small crateriform gv3, between JV2 bases, 16 apart. A pair of poroids iv5 and three pairs of poroids ivo also discernible. Unsclerotized cuticle arround ventrianal shield with a pair of setae (JV5). Seta JV5 smooth, 48 long.

*Chelicerae* (Fig. 5c) – Fixed digit 23 long, with at least ten teeth discernible; and movable digit 23 long, with no teeth discernible. Spermatodactyl shaft 21 and branch 7. *Pilus dentilis* not visible.

*Legs* (Fig. 5d) – All legs with pointed macrosetae similar to adult female. Measurements: Sgel not measured, Sgel II 24, Sgel III 30, StiII 30, Sgel IV 60, StiIV 55, StiV 57. Chaetotactic formula of genua II and III similar to adult female.

**Specimens examined.** One single ♂ collected during this study, measured and deposited as a complementary voucher specimen.

**MAURITIUS ISLAND. Curepipe,** Anderson Street (560 m aasl, 20°19′11″ S, 57°31′52″ E), one ♂ (along with eight ♀♀ on the same leaves of the same plant collected in the same time) on *Araucaria columnaris* (Forster) Hook (Araucariaceae), 4/XI/2018.

**Voucher material.** One male on one slide is deposited in Institut Agro (Montpellier SupAgro) – INRAE Acarology collection, Montpellier, France.

**Differential diagnosis and remarks.** This species belongs to the *obtusus* species group as seta z4 is minute and female ventral shield is not vase-shaped or divided. It belongs to the *andersoni* species subgroup as the spermatheca has a differentiated atrium, a calyx not dotted or annulated, not swollen basally and calyx dish-, cup-, bell- or V-shaped. The following combination of characters, indicated below in the description of the male of this species, is quite similar to the few described males of species of *Amblyseius* belonging to the *obtusus* species group and to the *andersoni* species subgroup.

Not many characters allow to distinguish it from all males of other species if no females are collected in the same time: the peritreme reaching level of j1, absence of reticulation of the dorsal shield, some dorsal setae lengths, especially z2, z4, r3 and S2 approximately of the same length (12–15), additional macrosetae on all other legs than leg IV, macrosetae of leg IV not subequal, a sternogenital shield smooth, ventrianal shield reticulate, only three pairs of pre-anal setae, a pair of crateriform gv3 between JV2. All described males of the large species subgroup *andersoni* have similar ventrianal shield reticulate with three pairs of pre-anal setae.

Characters of males are very similar to that of adult females, except of course for length of setae and few other characters. The only difference is that ventrianal shield of the male is moderately reticulate, while the ventrianal shield of the female is not.
Figure 5 Paratype male of *Amblyseius haleakalus* Prasad – a. Dorsal shield, b. Ventral shields, c. Spermatodactyl, d. Genu, tibia and basitarsus of leg IV.

Kreiter S. et al. (2021), *Acarologia* 61(4): 845-889. https://doi.org/10.24349/Krky-e23s
Amblyseius parasundi Blommers

Amblyseius (Proprioseiopsis) parasundi Blommers 1974: 144.
Amblyseius (Amblyseius) parasundi, Denmark & Muma 1989: 19.
Amblyseius parasundi, Moraes et al. 1986: 27, 2004b: 46.

Description of adult male of Amblyseius parasundi Blommers (n = 8, Figs 6 a-d)
Dorsum (Fig. 6a) – Dorsal shield smooth, 265 (253–275) long and 179 (170–213) wide, with only four solenostomes difficult to distinguish (gd2, gd4, gd8 and gd9), four pairs of poroids, 18 pairs of dorsal setae (r3 and R1 on dorsal shield): j1 29 (26–33), j3 39 (38–41), j4 4 (4–5), j5 4, j6 5 (4–5), J2 5 (5–6), J5 7 (5–8), z2 7 (6–8), z4 7 (7–8), z5 5 (4–5), Zh 42 (130–150), Z5 364 (350–383), z4 140 (133–146), S2 7 (6–8), S4 8 (6–8), S5 6 (5–7), r3 13 (11–15), R1 7 (6–8). All setae sharp-tipped and smooth, except for Z4 and Z5 lightly serrate.

Peritreme and peritremal plate (Fig. 6a) – Extending to level of j1; peritremal plate fused with dorsal shield at level between z2 and z4.

Venter (Fig. 6b) – Sternogenital shield smooth with very few striae, five pairs of setae (st3-st5) and two pairs of poroids (ivo and iv2). Distances st1-st5 54 (49–58), st2-st2 62 (60–63), st3-st3 58 (50–59), st1-st5 117 (113–120), st4-st4 43 (40–45), st5-st5 38 (34–41). Ventrianal shield 119 (115–125) long, 153 (145–160) wide at anterior corners and 64 (58–70) wide at level of para-anal setae. Ventrianal shield striate, with three pairs of pre-anal setae (JV1, JV2 and ZV2) and a pair of small rounded gv3, between JV2 just below the line between their bases, 16 (13–20) apart. A pair of iv5 and two pairs of poroids ivo also discernible. Unsclerotized cuticle around ventrianal shield with a pair of setae (JV5). Seta JV5 smooth, 65 (60–69) long.

Chelicerae (Fig. 6c) – Fixed digit 24 (22–25) long, with 11 teeth discernible; and movable digit 27 (25–28) long, with three teeth discernible. Spermatodactyl shaft 15 (13–18) long and branch 5 (4–5). Pilus dentilis not visible.

Legs (Fig. 6d) – All legs with sharp-tipped macrosetae similar to adult female. Measurements: Sgel 61 (55–65), Sgel II 39 (37–40), Sgel III 56 (48–58), StIII 46 (43–49), Sgel IV 171 (160–180), StIV 128 (122–138), StV 94 (90–98). Chaetotactic formula of genua II and III similar to adult female. One erected seta on femur IV.

Specimens examined. Eight ♂♂ collected during this study, measured and deposited as complementary voucher material. MAYOTTE ISLAND: Coconi, Maison de l’Office National des Forêts (156 m asl, 12°50′1″ S, 45°8′5″ E), 1 ♂ on Terminalia catappa L. (Combretaceae), 24/XI/2018; Combani, site de Mont-Combani (437 m asl, 12°48′23″ S, 45°9′17″ E), 1 ♂ on Cocos nucifera (Areaceae), and 1 ♂ on Cananga odorata L. (Annonaceae), 25/XI/2018; L’Abattoir, Dziani lake (23 m asl, 12°46′14″ S, 45°17′18″ E), 1 ♂ on Artocarpus altillis (Parkinson) Fosberg (Moraceae), 27/XI/2018. MOHELI ISLAND: Hoani, inside village (38 m asl, 12°17′3″ S, 43°44′34″ E), 1 ♂ on Theobroma cacao L. (Malvaceae), 3/XII/2018; Bangoma, Les Hauts (137 m asl, 12°17′18″ S, 43°43′41″ E), 1 ♂ and 1 im. on Cinnamomum odoratum Schäffer (Lauraceae), 1 ♂ on Annona muricata L. (Annonaceae) and 1 ♂ on Litchi chinensis Sonnerat ( Sapindaceae), 4/XII/2018.

Voucher material. Eight males on eight slides are deposited in Institut Agro (Montpellier SupAgro) – INRAE Acarology collection, Montpellier, France.

Differential diagnosis and remarks. This species has no seta Z1 and consequently belongs to the sundi species group and having the spermataheca elongate, tube-like, it belongs to the sundi species subgroup. The following combination of characters indicated below in the description of the male of this species is quite similar to the unique described males of species of Amblyseius belonging to the sundi species group and to the sundi species subgroup. Not many characters allow distinguishing it from the single described male of this sundi subgroup, the male of A. sundi Pritchard & Baker. If no females are collected in the same time, the identification will be impossible. These characters are: the peritreme reaching level of j1, absence of reticulation of the dorsal shield, some dorsal setae length, especially j-J serie starting to j4, z2 to z5, R1 and S series (after s4) approximately of the same length (4–8), additional macrosetae on all other legs than leg IV, macrosetae of leg IV not subequal and long, sternogenital shield smooth,
Figure 6 Paratype male of *Amblyseius parasundi* Blommers – a. Dorsal shield, b. Ventral shields, c. Spermatodactyl, d. Genu, tibia and basitarsus of leg IV.
ventrianal shield reticulate, only three pairs of pre-anal setae, a pair of round gv3 between JV2, a macroseta present also on genu II, only three teeth on the movable digit and 11 on the fixed digit of chelicera instead of one and six in the male chelicera of A. sundi, respectively.

Characters of males are very similar to adult females, except for course of lengths of setae and other few characters. The only difference is that the ventrianal shield of the male is lightly reticulate in the anterior part and the ventrianal shield of the female is not.

Blommers and Gutierrez (1975) found this species very abundant on fruit trees preying on several species of tetranychid mites. Amblyseius sundi is reported by Blommers (1974) as being a thelytokous species in mass-rearing and field collected specimens and similar information is also mentioned by Denmark and Muma (1989). In nature, reproduction of A. parasundi seems more complicated. Males were not so rare in fields of the two Islands where they were found (Mayotte and Mohéli). This suggests further fundamental studies on the biology of this species.

**Tribe Euseiini Chant & McMurtry**
Euseiini Chant & McMurtry 2005a: 191.

**Subtribe Typhlodromalina Chant & McMurtry**
Typhlodromalina Chant & McMurtry 2005a: 195.

**Genus Typhlodromalus Muma**
Amblyseius (Typhlodromalus) Muma 1961: 288; Typhlodromalus De Leon 1966: 87.

**Typhlodromalus baillodi Kreiter n. sp.**
Zoobank: 7BDF476B-99F0-4CDE-A946-574CF826D1A0

**Classification.** Typhlodromalus baillodi Kreiter n. sp. belongs to:

- the subfamily Amblyseiinae (absence of dorsolateral setae z3 and s6 and the caudoventral seta JV3),
- to the tribe Euseiini (sternal shield with median posterior projection, deutosternal groove > 5 μm in width, forward migration of pre-anal setae JV2 and ZV2),
- to the subtribe Typhlodromalina (chelicera of normal size and shape, with prominent teeth evenly distributed along fixed digit, peritreme usually extending to level of j1, deutosternal groove narrow, 4–7 μm width),
- to the genus Typhlodromalus (female ventrianal shield with more than one pair of pre-anal setae, GeI usually with a macroseta, GeII and III with macrosetae, leg IV with three macrosetae usually stout, often knobbled or blunt, male ventrianal shield with three pairs of pre-anal setae, most dorsal setae either setiform or thickened, thorn like, tapering distally, without terminal knobs, fixed digit with 6–12 teeth evenly distributed along the digit, BtI without erected seta, female ventrianal shield with three pairs of pre-anal setae, ratio s4/Z1 < 3.0 : 1.0, dorsal setae of medium length subequal, dorsal shield ornamented in addition to anterolateral striations, seta Z4 longer than distance between its base and that of S4,
- to the peregrinus species group as seta S5 is present (Chant and McMurtry 2007) which includes 16 species (Chant and McMurtry 2005a but incomplete): T. araucariae Gonçalves & Ferla, T. aripo De Leon, T. clavicus Denmark & Muma, T. erigeronus Denmark & Evans, T. etiennei (Kreiter & Ueckermann), T. ferest Lofego, Moraes & McMurtry, T. feresi similis Moraes, Barbosa & Castro, T. ingae Moraes, Barbosa & Castro, T. jucundus (Chant), T. marmoreus (El-Banhawy), T. olombo (Pritchard & Baker), T. peregrinus (Muma), T. planetarius (De Leon), T. pumilus Denmark & Evans, T. rosayroi Denmark & Muma and T. simus Denmark & Muma.
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Description of adult female (n = 15 of 44 collected during this study, Figs. 7 a–e)

Dorsum (Fig. 7a) – Dorsal shield strongly ornamented and reticulate, with margins of posterior part slightly indented at level of S35 creating a slight “trilobite appearance”, with an expansion on each lateral side at level of s4-Z1 and with a constriction at level of R1, 310 (283–333) long and 187 (165–210) wide at level of s4, with seven solenostomes (gd1, gd2, gd4, gd5, gd6, gd8 and gd9), 14 pairs of poroids, 17 pairs of dorsal setae and two pairs of sub-lateral setae: j1 24 (23–25), j3 24 (20–30), j5 14 (13–15), j6 14 (12–15), j6 18 (15–20), J2 20 (18–23), J5 8 (7–10), z2 22 (20–25), z4 26 (23–28), z5 18 (15–20), Z1 21 (18–24), Z4 32 (29–38), Z5 60 (54–68), s4 33 (29–35), S2 29 (25–33), S4 24 (18–28), S5 15 (13–18), r3 21 (18–24), R1 19 (16–23). All setae thickened and smooth, except for Z5 strongly serrate.

Peritreme and peritremal plate (Fig. 7a) – Extending to level of j1; peritremal plate fused with dorsal shield at level between j1 and j3, much closer to j3.

Venter (Fig. 7b) – All shields smooth. Sternal shield with three pairs of setae (st1-st5) and two pairs of rounded poroids (iv1 and iv2); a pair of st4 and a pair of rounded pores (iv2) on a metasternal plate; posterior margin of the sternal shield convex, with a posterior projection. Distances st1-st1 52 (44–58), st2-st2 60 (55–65), st3-st3 69 (63–75), st1-st3 61 (53–65), st4-st4 69 (61–83). Genital shield length 107 (103–119), width at level of st5 70 (63–75), width at level of anterior corners 75 (68–80), distance st5-st5 66 (63–70). Two pairs of metapodal plates 16 (10–19) long and 4 (2–5) wide for the larger and 8 (5–10) long and < 1 wide for the slender. Ventrianal shield 101 (90–113) long, 64 (58–70) wide at level of anterior corners (ZV2), and 65 (61–70) wide at level of para-anal setae. Ventrianal shield smooth, with three pairs of pre-anal setae (JV1, JV2 and ZV2), and a pair of evolved and oblong crateriform gvs, 23 (19–25) apart. Unsclerotized cuticle around ventrianal shield with four pairs of setae (JV4, JV5, ZV1 and ZV3), and five pairs of round to oblong poroids iv0 and ivp. Seta JV5 thickened and smooth, 39 (30–43) long.

Chelicerae (Fig. 7c) – Fixed digit 26 (25–28) long, with five teeth in row and one subapical tooth; and movable digit 27 (25–28) long, with two teeth. Ptilus dentilis not visible.

Spermatheca (Fig. 7d) – Remains of that of Ueckermannseius payetae Kreiter n. sp. in the new species group hauv of the genus Ueckermannseius, with the atrium bulbous and elongate, the calyx basally swollen, bladder-like and then elongate and slender, 36 (30–45) long and 9 (8–11) wide at the widest of the calyx, small minor digit visible.

Legs (Fig. 7e) – Thickened blunt macrosetae on tibia III, tarsus III and tibia IV, thickened knobbled macrosetae on genu I–III, genu and basitarsus IV. Measurements: Sgel 10 (9–11), Sgel II 11 (9–13), Sgel III 20 (16–22), StilI 15 (13–15), StilII 14 (13–16), Sgel IV 29 (23–33), StilV 18 (15–20), StilV 50 (45–58). Genua II and III both with seven setae. Chaetotactic formula of genu II: 2-2/0, 2/0-1; genu III: 1-2/1, 2/0-1.

Description of adult male (n = 9, Figs. 8 a-d)

Dorsum (Fig. 8a) – Dorsal shield similar to adult female, 238 (218–275) long and 154 (140–173) wide, with seven solenostomes (gd1, gd2, gd4, gd5, gd6, gd8 and gd9) similar to adult female, 14 pairs of poroids visible, 19 pairs of dorsal setae (r3 and R1 on dorsal shield): j1 20 (18–23), j3 21 (18–23), j4 12 (10–14), j5 12 (11–13), j6 13 (12–15), J2 15 (13–16), J5 7 (7–8), z2 17 (15–19), z4 20 (18–22), z5 13 (13–15), Z1 16 (15–20), Z4 23 (21–25), Z5 40 (36–43), s4 25 (23–28), S2 21 (20–24), S4 16 (15–18), S5 12 (11–13), r3 16 (14–18), R1 14 (11–16). All setae thickened and smooth, except for Z5 slightly serrate.

Peritreme and peritremal plate (Fig. 8a) – Extending to level of j1; peritremal plate fused with dorsal shield at level between j3 and z2.

Venter (Fig. 8b) – Stermogenital shield smooth, except for edges that are very slightly striate, with five pairs of setae (st1-st5) and two pairs of poroids (iv1 and iv2). Distances st1-st1 45 (43–46), st2-st2 53 (50–56), st3-st3 56 (53–59), st1-st5 100 (94–103), st4-st4 46 (43–49), st5-st5 36 (34–38). Ventrianal shield 96 (88–108) long, 132 (123–140) wide at anterior corners and 63 (55–75) wide at level of para-anal setae. Ventrianal shield with three pairs of pre-anal setae (JV1, JV2 and ZV2), and a pair of large crateriform solenostome gvs, between JV2, 18 (15–20) apart. A pair of iv5 and four pairs of poroids iv0 discernible. Unsclerotized cuticle
Figure 7. Holotype female of *Typhlodromalus baillodi* Kreiter n. sp. – a. Dorsal shield, b. Ventral shields, c. Chelicera, d. Spermatheca, e. Genu, tibia and basitarsus of leg IV.
Figure 8 Paratype male of *Typhlodromalus baillodi* Kreiter n. sp. – a. Dorsal shield, b. Ventral shields, c. Spermatodactyl, d. Genu, tibia and basitarsus of leg IV.
arround ventrianal shield with a pair of setae (JV5). Seta JV5 pointed and smooth, but not thickened as in adult female, 20 (19–22) long.

*

Chelicerae* (Fig. 8c) – Fixed digit 20 (16–21) long, with six or seven teeth discernible; and movable digit 19 (18–21) long, apparently edentate. Spermatodactyl shaft 18 (14–20) and branch 5 (4–6).

Legs (Fig. 8d) – All legs with at least one macroseta similar to adult female, except that in male only genu III has a macroseta, not tibia III. Measurements: SgeI 9 (8–10), SgeII 10 (9–12), SgeIII 14 (13–16), SgeIV 20 (19–23), StIIV 14 (13–15), StIV 36 (34–38). Chaetotactic formula of genua II and III similar to adult female.

Material examined. Fourty-four ♀♀, nine ♂♂ and two imm. collected during this study, fifteen ♀♀ and nine ♂♂ and two imm. as type material.

**MAYOTTE ISLAND** (29 ♀♀ and 1 ♂): *Coconi*, Maison de l’Office National des Forêts (156 m aasl, 12°50′1″ S, 45°8′5″ E), 1 ♀ on *Terminalia catappa* L. (Combretaceae) and 1 ♀ on *Cananga odorata* L. (Annonaceae), 24/XI/2018; *Combani*, gîte du Mont-Combani (437 m aasl, 12°48′23″ S, 45°9′17″ E), 1 ♀ on *Psidium guajava* L. (Myrtaceae), 2 ♀♀ on *Hydrangea aspera* Buchanan-Hamilton ex D. Don (Hydrangeaceae) and 8 ♀♀ on *Bidens pilosa* L. (Asteraceae), 25/XI/2018; *Coconi*, Lycée Agricole (189 m aasl, 12°50′7″ S, 45°8′11″ E), 3 ♀♀ on *Solanum melongena* L. (Solanaceae), 2 ♀♀ on *Ageratum conizoides* L. (Asteraceae), 26/XI/2018; L’Abattoir, Dziani lake (23 m aasl, 12°46′14″ S, 45°17′18″ E), 11 ♀♀ and 1 ♂ on *Ricinus communis* L. (Euphorbiaceae), 27/XI/2018.

**MOHELI ISLAND** (15 ♀♀, 8 ♂♂ and 2 imm.): *Fomboni*, University (25 m aasl, 12°17′3′′ S, 43°44′34′′ E), 2 ♀♀ on *Zyzyphus mauritiana* Lamarck (Malvaceae) and 12 ♀♀, 8 ♂♂ and 2 imm. on *Ricinus communis* L. (Euphorbiaceae), 27/XII/2018; *Hoani*, inside village (38 m aasl, 12°17′3″ S, 43°44′34″ E), 1 ♀ on *Amaranthus viridis* L. (Amaranthaceae), 3/XII/2018.

Type material. The holotype female, 43 paratype females, nine paratype males and two immatures are deposited in Institut Agro (MSA) – INRAE Acarology collection, Montpellier, France.

Etymology. The name “baillodi” refers to the family name of the researcher Dr Marc Baillod, who has worked during his career at the Station Fédérale de Recherche Agronomique de Changins in Switzerland (now called Agroscope) and has published many useful papers on plant inhabiting mites in agrosystems. He contributed towards the senior author’s knowledge of the Phytoseiidae (taxonomy, biology, ecology, side effects of pesticides, etc.) more than 35 years ago. Marc Baillod was a real Master and deserves billions of billions of thanks! This new species is named in his honour.

**Differential diagnosis and remarks.** This species is very original by the set of characters described above. Lengths of most of the major setae are very similar to those obtained by Yoshida-Shaul and Chant (1991) for *T. fragosoi* Yoshida-Shaul & Chant and by Kreiter et al. (2002) for *T. etiennei* Kreiter & Ueckermann. However, the unique shape of the spermatheca not only distinguishes it from the latter two species, but also from all known species of the genus *Typhlodromalus*. The spermatodactyl also distinguishes it from that of *T. spinosus* Meyer and Rodrigues, allowing an easy distinction between the two species mentioned from this region.

**Genus Ueckermannseius Chant & McMurtry**

_Ueckermannia_ Chant & McMurtry 2005a: 201. Preoccupied by _Ueckermannia_ Kaźmierski, 1996 (Tydeidae).

_Ueckermannseius_ Chant & McMurtry 2005b: 337, 2007: 115.

We describe here **three new species groups** within the genus _Ueckermannseius_ and **three new species** belonging to the same species group.
**Ueckermannseius gutierezzi** Kreiter n. sp.

**Zoobank**: A56A4712-1C00-4F5B-84BE-2B9592180D24

**Classification.** *Ueckermannseius gutierezzi* Kreiter n. sp. belongs to:

- the subfamily Amblyseiinae (absence of dorsolateral setae z3 and s6 and the caudoventral seta JV3),
- to the tribe Euseiini (sternal shield with median posterior projection, deutosternal groove > 5 µm in width, forward migration of pre-anal setae JV2 and ZV2),
- to the subtribe Typhlodromalina (chelicera of normal size and shape, with prominent teeth evenly distributed along fixed digit, peritreme usually extending to level of j1, deutosternal groove narrow, 4–7 µm width),
- to the genus *Ueckermannseius* (dorsal setae short/minute, shorter than distances between their bases, seta Z4 not as long as distance between its base and that of S4, dorsal shield smooth, except for anterolateral striation) (Chant and McMurtry 2007),
- to the new species-group *havu* Kreiter, with spermatheca with the atrium bulbous, the calyx basally swollen, bladder-like and then elongate and slender. This kind of spermatheca is shared by 13 African species of *Ueckermannseius* we proposed to include in the new species group *havu*: *U. bundibugyoensis* Moraes, Zannou & Oliveira, *U. eastafricana* Moraes, Zannou & Oliveira, *U. havu* (Pritchard & Baker), *U. lugula* El-Banhawy & Irungu, *U. macrosetosus* (van der Merwe), *U. nesiotes* (Ueckermann & Kreiter), *U. neohavu* Moraes, Zannou & Oliveira, *U. parahavu* Moraes, Zannou & Oliveira, *U. quilicii* (Ueckermann & Kreiter), *U. sabatiae* El-Banhawy & Knapp, *U. saltus* (Denmark & Matthysse) and *U. ueckermanni* Moraes, Zannou & Oliveira.

The two other new species groups proposed are:

- the species group *ultimus* Kreiter, with spermatheca elongate, tubular, flared distally with an atrium prominent, but small. This kind of spermatheca is shared by six African species of *Ueckermannseius* we proposed to include in the *ultimus* species-group: *U. aequidens* Blommers, *U. bunya* El-Banhawy and Knapp, *U. kiminini* El-Banhawy and Knapp, *U. munsteriensis* (van der Merwe), *U. tenuiscutus* McMurtry and Moraes and *U. ultimus* (Chant and Baker),
- the species group *danhomensis* Kreiter, with spermatheca with calyx short, funnel-shaped, with an atrium distinctly bulbous. This kind of spermatheca is shared by only two species of *Ueckermannseius* we proposed to include in the *danhomensis* species-group: *U. danhomensis* Moraes, Zannou and Oliveira and *U. musoli* El-Banhawy and Knapp.

**Description of adult female** (n = 13, Figs. 9a-e)

*Dorsum* (Fig. 9a) – Dorsal shield smooth with only few striae anterolaterally, 330 (318–353) long and 214 (170–240) wide at level of s4, with seven solenostomes (gd1, gd2, gd4, gd5, gd6, gd8 and gd9), 12 pairs of poroids, 17 pairs of dorsal setae and two pairs of sub-lateral setae: j1 36 (34–40), j3 24 (22–25), j4 10 (8–10), j5 10 (8–10), j6 11 (9–13), j2 13 (10–14), J5 8 (6–9), z2 14 (13–15), z4 15 (13–16), z5 10 (9–11), Zl 12 (11–13), Z4 14 (13–16), Z5 42 (35–47), s4 23 (20–25), S2 14 (13–15), S4 13 (12–15), S5 14 (12–16), r3 18 (15–20), R1 13 (10–16). All setae smooth.

*Peritreme and peritremal plate* (Fig. 9a) – Extending to level between j3 and z2; peritremal plate fused with dorsal shield at a level between j3 and z2.

*Venter* (Fig. 9b) – Sternal shield smooth with few anterolateral striae, with three pairs of setae (st1-st3) and two pairs of poroids (iv1 and iv2); a pair of setae (st4) and a pair of pores.
Figure 9 Holotype female of *Ueckermannseius gutierrezi* Kreiter n. sp. – a. Dorsal shield, b. Ventral shields, c. Chelicera, d. Spermatheca, e. Genu, tibia and basitarsus of leg IV.
(iv3) on a small metasternal shield; posterior margin of the sternal shield convex, with a central projection. Distances st1-st1 58 (55–60), st2-st2 66 (62–70), st3-st3 78 (75–84), st1-st3 60 (54–64), st4-st4 85 (75–90). Genital shield smooth, 133 (125–143) long, width at level of st5 82 (78–93), width at level of posterior corners 95 (85–105), distance st5-st7 70 (70–81). One pair of metapodal plate 25 (19–28) long and 2 (1–4) wide. Ventrianal shield 100 (88–118) long, 61 (55–70) wide at level of anterior corners (ZV2), and 74 (65–80) wide at level of para-anal setae. Ventrianal shield smooth, with three pairs of pre-anal setae (JV1, JV2 and ZV2), and a pair of evolved and crateriform gv3, 34 (30–38) apart. Un sclerotized cuticle around ventrianal shield with four pairs of setae (JV4, JV5, ZV1 and ZV3), and four pairs of round to oblong poroids (ivo). Seta JV3 smooth, 34 (28–40) long.

Chelicerae (Fig. 9c) – Fixed digit 24 (23–26) long, with five teeth visible; and movable digit 26 (25–28) long, with one tooth. Pilus dentilis not visible.

Spermatheca (Fig. 9d) – With the atrium c-shaped, calyx basally swollen, bladder-like and then elongate and slender 34 (30–37) long and 8 (6–8) wide in the wider part, a small atrium adjacent to the calyx, small minor duct visible.

Legs (Fig. 9e) – Pointed whip-like macrosetae on genua I–III, titbia III, and basatarsus, tibia and genu IV. Measurements: Sgel 21 (18–25), SgelII 24 (22–25), SgelIII 34 (30–43), StilIII 28 (28–30), SgelIV 51 (43–55), StilIV 43 (38–47), StilV 76 (70–80). Genua II and III both with seven setae. Chaetotactic formula of genua II: 2-2/0, 2/0-1; genua III: 1-2/1, 2/0-1.

Description of adult male (n = 1, Figs. 10 a-c)

Dorsum (Fig. 10a) – Dorsal shield similar to adult female, 248 long and 175 wide, with seven solenostome well visible (gd1, gd2, gd4, gd5, gd6, gd8 and gd9), with only five poroids visible, 19 pairs of dorsal setae (r3 and R1 on dorsal shield): j1 25, j2 25, j4 8, j5 8, j6 8, j2 10, j5 5, z2 12, z4 13, z5 8. Z1 10, Z4 10, Z5 38, s4 20, S2 13, S4 12, S5 12, r3 17, R1 10. All setae smooth, except for Z5 lightly serrate.

Venter (Fig. 10b) – Stermogenital shield smooth, except for few striae posterolaterally, with five pairs of setae (st1-st5) and two pairs of poroids (iv1 and iv2). Distances st1-st1 47, st2-st2 55, st3-st3 53, st1-st5 103, st4-st4 48, st5-st5 39. Ventrianal shield 100 long, 145 wide at level of anterior corners, and 83 wide at level of para-anal setae. Ventrianal shield reticulate in the anterior part, above pores gv3, with three pairs of pre-anal setae (JV1, JV2, and ZV2), and a pair of evolved and crateriform gv3 between JV2, 23 apart. A pair of poroids iv5 and four pairs of poroids ivo on the ventrianal shield. Un sclerotized cuticle around ventrianal shield with a pair of setae (JV5). Seta JV5 smooth, 28 long.

Chelicerae – Fixed digit 20 long, no discernible teeth; and movable digit 20 long, with no discernible teeth. Spermatodactyl shaft renders measurement and illustration impossible.

Legs (Fig. 10c) – Pointed whip-like macrosetae on genua II and III and basatarsus, tibia and genu IV. Measurements: SgelI 13, SgelIII 20, SgelIV 15, SgelV 50. Chaetotactic formula of genua II and III similar to adult female.

Material examined. Thirteen ♀♀ and one ♂ collected during this study, measured and type material. ANJOUAN ISLAND: Pomoni, exit of the village (29 m aasl, 12°17’01” S, 44°34’37” E), 1 ♀ on Gliricidia sepium (Jacquin), Kunth ex Walpers (Fabaceae) and 1 ♀ Hibiscus tiliaceus L. (Malvaceae), 30/XI/2018. MOHELI ISLAND: Bandar-Es-Salam, Les Abous Inn (23 m aasl, 12°17’37” S, 43°45’27” E), 11 ♀♀ and 1 ♂ on Carica papaya L. (Caricaceae), 2/XII/2018.

Type material. The holotype ♀, twelve paratype ♀♀ and one paratype ♀ are deposited in Institut Agro (MSA) – INRAE Acarology collection, Montpellier, France.

Etymology. The name “gutierrezii” refers to the family name of the researcher Dr Jean Gutierrez, who has worked during his career at ORSTOM (= IRD for now) and have published many papers on plant inhabiting mites, mainly tetranychid mites, from Indian Ocean among many other sites. He has helped the senior author in many aspects at the beginning of his career, especially with exciting and stimulating scientific discussions on mites and many other subjects. This species is named in his honour.
Figure 10 Paratype male of *Ueckermannseius gutierrezi* Kreiter *n.* sp. – a. Dorsal shield, b. Ventral shields, c. Genu, tibia and basitarsus of leg IV.
Differential diagnosis and remarks. This species closely resembles *U. neohavu* concerning length of setae on dorsal shield. However, it differs from the latter in having: setae at m4, R1, s4, z2, z4 and Z3 shorter with Z5 serrate, ventral shield and calyx of spermatheca shorter, cheliceral digits also shorter with less teeth (5/1 in the new species compared to 11/4 in *U. neohavu* (Table 3). It is also close to *U. macrosetosus*, but differs in shorter dorsal setae especially s4, z2, z4, Z5 and all macrosetae, except for StIV longer, by fewer teeth on both digits of chelicera and the shape of macrosetae on both pointed and knobbed as in *U. macrosetosus*.

### Table 3

Comparison of characters of the 13 species of *Ueckermanniella* of the *havu* Kreiter *new species group* with those of the three new species of *Ueckermanniella* described in this paper.

| Character | *Ueckermanniella tulumarti* | *U. neohavu* | *U. macrosetosus* | *U. havu* | *Ueckermanniella havana* |
|-----------|-----------------------------|--------------|-------------------|---------|------------------------|
| Setae length | 5/1 | 11/4 | 5/1 | 5/1 | 5/1 |
| Ventral shield | Smooth, pointed | Smooth, pointed | Smooth, pointed | Smooth, pointed | Smooth, pointed |
| Calyx of spermatheca | Shorter | Shorter | Shorter | Shorter | Shorter |
| Cheliceral digits | Shorter | Shorter | Shorter | Shorter | Shorter |

* In all figures, the ruthenium tetroxide is stained with 0.01% toluidine blue. *U. neohavu* is stained with 0.01% toluidine blue. *U. havu* and *U. macrosetosus* are stained with 0.01% toluidine blue.
It also closely resembles *U. eastafricæ* Moraes, Zannou & Oliveira, but differs by shorter setae $z_2$ and $z_4$ and a longer $Z_5$, a longer $StIV$, by the fewer teeth on both digits of chelicera and the shape of macrosetae that are all pointed in the new species and not knobbed as in *U. eastafricæ*, the shape of macrosetae being considered as a diagnostic character in all previous descriptions.

This species was identified as *U. eastafricæ* in two previous papers (Kreiter et al. 2021a, c) for fauna of Anjouan and Mohéli Islands, but here it is considered a new species in the new *havu* species group Kreiter (Table 3) and named *U. gutierezzi* Kreiter n. sp.

**Ueckermannseius jean-mariei Kreiter n. sp.**

*Zoobank:* 4506C84E-D900-46A5-AAC3-1D9A9288EA06

**Classification.** *Ueckermannseius jean-mariei* Kreiter n. sp. belongs to:

- the subfamily Amblyseiinae (absence of dorsolateral setae $z_3$ and $s_6$ and the caudoventral seta $J9$),
- to the tribe Euseiini (sternal shield with median posterior projection, deutosternal groove $>5\mu m$ in width, forward migration of pre-anal setae $JV2$ and $ZV2$),
- to the subtribe Typhlodromalina (chelicera of normal size and shape, with prominent teeth evenly distributed along fixed digit, peritreme usually extending to level of $j1$, deutosternal groove narrow, 4–7 $\mu m$ width),
- to the genus *Ueckermannseius* (dorsal setae short/minute, shorter than distances between their bases, seta $Z4$ not as long as distance between its base and that of $S4$, dorsal shield smooth, except for anterolateral striation) (Chant and McMurtry 2007),
- Like the two previous species and for the same reasons, to the species-group *havu* Kreiter new species group (see text for *U. gutierezzi* Kreiter n. sp.).

The following list of characters of this new species is very different from all other species of the genus and the species group. So, despite the fact that we collected a single specimen, we still consider to describe this very original specimen as belonging to a very original new species.

**Description of adult female** ($n=1$, Figs. 11 a-e)

*Dorum* (Fig. 11a) – Dorsal shield smooth with only very few anterior striae, 325 long and 238 wide at level of waist, with seven solenostomes ($gd1$, $gd2$, $gd4$, $gd5$, $gd6$, $gd8$ and $gd9$), eight pairs of poroids visible, 17 pairs of dorsal setae and two pairs of sub-lateral setae; all setae subequal in length (7–13), except for $j1$ which is the longest: $j1$ 28, $j3$ 11, $j4$ 8, $j5$ 7, $j6$ 9, $j2$ 10, $j5$ 7, $z2$ 12, $z5$ 8, $Z1$ 9, $Z4$ 10, $Z5$ 21, $s4$ 13, $S2$ 11, $S4$ 10, $S5$ 10, $r3$ 12, $R1$ 11. All setae smooth.

*Peritreme and peritremal plate* (Fig. 11a) – Extending to level between $j1$ and $j3$, but much closer to $j1$; peritremal plate fused with dorsal shield at level of $j1$.

*Venter* (Fig. 11b) – Sternal shield smooth with few lateral striae, with three pairs of setae ($st1-st3$) and two pairs of poroids ($iv1$ and $iv2$); a pair of seta ($st4$) and a pair of pores ($iv3$) on a small metasternal plate; posterior margin of the sternal shield with a central posterior projection. Distances $st1-st1$ 59, $st2-st2$ 63, $st3-st3$ 73, $st1-st3$ 59, $st4-st4$ 83. Genital shield smooth, 130 long, width at level of $st5$ 78, width at level of posterior corners 84, distance $st5-st5$ 70. A pair of metapodal plates, 28 long and 3 wide. Ventrianal shield 110 long, 50 wide at level of anterior corners ($JV2$), and 55 wide at level of para-anal setae. Ventrianal shield smooth, with three pairs of pre-anal setae ($JV1$, $JV2$ and $ZV2$), and a pair of evolved and crateriform $gv3$ postomerosed $JV2$, 30 apart. Unscerotized cuticle around ventrianal shield with four pairs of setae ($JV4$, $JV5$, $ZV1$ and $ZV3$) and four pairs of round to oblong poroids not well discernible. Seta $JV5$ smooth, 50 long.
**Figure 11** Holotype female of *Ueckermannseius jean-mariei* Kreiter **n. sp.** — a. Dorsal shield, b. Ventral shields, c. Chelicera, d. Spermatheca, e. Genu, tibia and basitarsus of leg IV.
Chelicerae (Fig. 11c) – Fixed digit 25 long, with one tooth not well visible because digit not well positioned; and movable digit 26 long, edentate, but digit also not well positioned. Pilus dentilis not visible.

Spermatheca (Fig. 11d) – Like the two other new species of Ueckermannseius, spermatheca is with the atrium bulbous, the calyx basally swollen, bladder-like and then elongate and slender, this shape of the spermatheca is shared by ten African species of Ueckermannseius of the species group havu Kreiter new species group. Spermatheca 30 long and 3 wide at the widest base of calyx.

Legs (Fig. 11e) – Pointed whip-like macrosetae on genua II and III, on tibia III, basitarsus, tibia and genu IV. Measurements: SgeII 25, SgeIII 35, StiIII 28, SgiV 62, StiiV 45, Stiv 55. Genua II and III both with seven setae. Chaetotactic formula of genu II: 1-2/1, 2/0-1; genu III: 1-2/1, 2/0-1.

Male. Unknown.

Material examined. One single female collected during this study, measured and type material. GRANDE COMORE ISLAND: Ivembeni, Banda Samlini (791 m asl, 11°29′22″ S, 43°19′36″ E), 1 ♀ on Rubus rosifolius Smith (Rosaceae), 7/XII/2018.

Type material. The holotype female on one slide together with the holotype female of Amblyseius erici Kreiter n. sp., two females of Typhlodromalus spinosus (Meyer & Rodrigues) and two females of Amblyseius herbicolus (Chant) (see above) are deposited in Institut Agro (Montpellier SupAgro) – INRAAcarology collection, Montpellier, France.

Etymology. The name “jean-mariei” refers to the first name of the eldest brother of the senior author after him, Jean-Marie Kreiter. The species is named in his honour.

Differential diagnosis and remarks. This species is very similar to U. quilicii concerning length of setae (Table 3). However, comparison with the available characters listed in Table (3) shows that the new species has: macrosetae all pointed (against knobbed in U. quiliciii), a longer seta JV5, longer macrosetae on leg IV, both digits of chelicera longer and with less teeth (1/0 in the new species compared to 6–8/1 in U. quiliciii). Other species of the species group havu Kreiter new species group are very different in many aspects concerning measurements and shape of characters (Table 3).

Ueckermannseius payetae Kreiter n. sp.

Zoobank: 467E989B-C03A-4997-8E25-823EECB3A126

Classification. Ueckermannseius payetae Kreiter n. sp. belongs to:

- the subfamily Amblyseiinae (absence of dorsolateral setae z3 and s6 and the caudoventral seta JV3),
- to the tribe Euseiini (sternal shield with median posterior projection, deutosternal groove > 5 μm in width, forward migration of pre-anal JV2 and ZV2),
- to the subtribe Typhlodromalina (chelicera of normal size and shape, with prominent teeth evenly distributed along fixed digit, peritreme usually extending to level of j1, deutosternal groove narrow, 4–7 μm width),
- to the genus Ueckermannseius (dorsal setae short/minute, shorter than distances between their bases, seta Z4 not as long as distance between its base and that of S4, dorsal shield smooth, except for anterolateral striation) (Chant and McMurtry 2007),
- it also belongs to the species-group havu Kreiter new species group for the same reasons as the previous species (see text for previous species).

Description of adult female (n = 5, Figs. 12 a-e)

Dorsum (Fig. 12a) – Dorsal shield smooth with only few striae in anterior part, 325 (318–335) long and 204 (193–215) wide at level of s4, with seven solenostomes (gd1, gd2, gd4, gd5,
Figure 12 Holotype female of *Ueckermannseius payetae* Kreiter n. sp. – a. Dorsal shield, b. Ventral shields, c. Chelicera, d. Spermatheca, e. Genu, tibia and basitarsus of leg IV.
five visible poroids, 17 pairs of dorsal setae and two pairs of sub-lateral setae on the membrane: j1 26 (23–29), j2 23, j4 8, j5 6, j6 10 (9–10), J2 10 (9–11), J5 9 (8–10), z2 17 (16–18), z4 13 (11–15), z5 7 (5–8), Z1 14 (12–17), Z4 16 (13–18), Z5 21 (20–23), s4 14 (13–16), S2 15 (13–16), S4 15 (13–16), S5 16 (13–18), r3 13 (10–13), R1 16 (15–18). All setae smooth.

Peritreme and peritremal plate (Fig. 12a) – Extending to level of j1; peritremal plate fused with dorsal shield at level between j1 and j3.

Venter (Fig. 12b) – Sternal shield smooth with few anterolateral striae, with a posterior projection well visible, with three pairs of setae (st1-st3) and no visible pairs of poroids; a pair of setae (st4) on a pair of metasternal plate with no visible pores (iv3). Distances st1-st1 55 (50–60), st2-st2 63 (59–70), st3-st3 71 (68–75), st1-st3 58 (55–63), st4-st4 73 (66–83). Genital shield smooth, 114 (108–125) long, width at level of st5 70, width at level of the posterior corners 88, distance st5-st5 68 (66–70). Two pairs of metapodal plates 24 (21–28) long and 3 wide for the primary and 11 (10–12) long and 1 wide for the secondary plate. Ventrianal shield 103 (100–105) long, level at of anterior corners (ZIV) not visible because of eggs present in five female specimens collected and so, not measurable, and 65 wide at level of anal-anae setae. Ventrianal shield smooth with three pairs of pre-anae setae (JVI, JVII and JVII), and a pair of crateriform gv3, 25 apart. Un sclerotized cuticle around ventrianal shield with four pairs of setae (JIV, JVIII, ZVII and ZVIII) and five pairs of round to oblong poroids (ivo). Seta JVII smooth and sharp-tipped, 32 (26–40) long.

Chelicerae (Fig. 12c) – Fixed digit 26 (25–28) long, with eight teeth; and movable digit 29 (28–30) long, with apparently three teeth. Pilus dentilis not visible.

Spermatheca (Fig. 12d) – With the atrium bulbous, the oblong calyx basally swollen, bladder-like and then elongate and slender, 21 (20–23) long and 8 (7–8) wide, atrium adjacent to calyx, small minor and slender major ducts visible.

Legs (Fig. 12e) – Pointed whip-like macrosetae on genua I-IV, tibia and basitarsus III and IV. Measurements: Sgel 25 (23–27), SgelI 17 (13–25), SgelIII 31 (25–40), StiliII 34 (33–35), StiliIII 24 (23–25), StiiV 30 (29–31), StiiV 50 (48–50), StiiV 51 (50–53). Genua II and III with seven and six setae, respectively. Chaetotactic formula of genua II: 2-2/0, 2/0-1; genua III: 1-2/0, 2/0-1.

Description of adult male (n = 2, Figs. 13 a-d)

Dorsum (Fig. 13a) – Dorsal shield smooth, 228–248 long and 155–160 wide at level of s4, with no solenostome visible, but probably with the same number as in adult female, no visible poroids either, 19 pairs of dorsal setae (r3 and R1 on dorsal shield): j1 23–25, j3 18, j4 4–5, j5 5, j6 6–8, j7 5–7, j8 2–6, j9 7–8, z5 5–6, Z1 8–10, Z4 8–10, Z5 25–30, s4 10, S2 8–10, S4 6–9, S5 5–8, r3 10, R1 8. All setae smooth.

Peritreme and peritremal plate (Fig. 13a) – Extending almost to level of j1; peritremal plate fused with dorsal shield at level between j1 and j3.

Venter (Fig. 13b) – Stermogenital shield smooth with five pairs of setae (st1-st5) and two pairs of poroids (iv1 and iv2); distances st1-st1 45–49, st2-st2 53, st3-st3 53, st1-st5 100–125, st4-st4 41–45, st5-st5 34–38. Ventrianal shield 100 long. 120–125 wide at level of anterior corners, and 50–58 wide at level of para-anal setae. Ventrianal shield reticulate anteriorly, anteriad pores gv3, suddenly narrows at level above anus, with three pairs of pre-anae setae (JVI, JVII and ZVII) and a pair of crateriform gv3 just under the line JVII-ZVII, 23 apart. Two pairs of poroids (ivo). Un sclerotized cuticle around ventrianal shield with a pair of setae (JVII). Seta JVII smooth and short, 17–20 long.

Chelicerae (Fig. 13c) – Fixed digit 23 long, with eight teeth; and movable digit 23–25 long, with two teeth. Spermatodactyl shaft 21–22.

Legs (Fig. 13d) – Pointed whip-like macrosetae on genua I-III, tibia and basitarsus III, basitarsus, tibia and genu IV. Measurements: Sgl 20, SgelI 20, SgelIII 24, StiiII 28, StiiII 18–20, SgelIV 38–40, StiiV 40, StiiV 40. Chaetotactic formula of genua II and III similar to adult female.
Figure 13 Paratype male of *Ueckermannseius payetae* Kreiter n. sp. – a. Dorsal shield, b. Ventral shields, c. Spermatodactyl, d. Genu, tibia and basitarsus of leg IV.
Material examined. Five ♀♀ and two ♂♂ collected during this study, measured and type material. MAYOTTE ISLAND: Coconi, Maison de l’Office National des Forêts (156 m aasl, 12°50’1” S, 45°8’5” E), 1 ♀ and 1 ♂ on Carica papaya L. (Caricaceae), 24/XI/2018; Coconi, Lycée Agricole (189 m aasl, 12°50’7” S, 45°8’11” E), 2 ♀♀ on Carica papaya L. (Caricaceae) and 2 ♀♀ and 1 ♂ on Trema orientalis (L.) Blume (Cannabaceae), 26/XI/2018.

Type material. The holotype ♀, four paratype ♀♀ and two paratype ♂♂ are deposited in Institut Agro (MSA) – INRAEA acarology collection, Montpellier, France.

Etymology. The name “payetae” refers to the family name of the researcher Rose-My Payet, co-author of this paper, who has worked during her career at CIRAD. She has helped the senior author in many aspects concerning fauna of Phytoseiidae of Indian Ocean Island. This species is named in her honour.

Differential diagnosis and remarks. This species is very similar to U. saltus concerning length of setae (Table 3). The description of U. saltus is however quite incomplete. But comparison with available characters listed in Table 3 (allows that the new species can be distinguished by having: peritreme ending at level of j1 (and not between j1 and j3 as illustrated by Mathysse and Denmark in 1981, or very close, but anteriorly to j1 as illustrated by Moraes et al. in 2006 for U. saltus), setae r3 and s4 slightly shorter, occurrence of clear macrosetae on genu I and tibia III, a shorter calyx of spermatheca and both digits of chelicera with less teeth (8/3 in the new species compared to 10/4 in U. saltus). However, the other species of the species group havu Kreiter new species group can be clearly distinguished (Table 3).

Subfamily Typhlodrominae Wainstein
Typhlodromini Wainstein 1962: 26 and Typhlodrominae Chant & McMurtry 1994: 235.

Tribe Typhlodromini Wainstein
Typhlodromini Wainstein 1962: 26.

Genus Typhlodromus Scheuten
Typhlodromus Scheuten 1857: 111.

Subgenus Anthoseius De Leon
Typhlodromus (Anthoseius) De Leon 1959: 258; van der Merwe 1968: 20; Karg 1982: 194; Chant & McMurtry 1994: 250, 2007: 149.

Typhlodromus (Anthoseius) grewiae Zannou, Moraes & Oliveira
Typhlodromus (Anthoseius) grewiae Zannou, Moraes & Oliveira in Ueckermann et al. 2008: 48.

Diagnosis. The male of this species has five solenostomes (gd2, gd4, gd6, gd8 and gd9) similar to adult female, all dorsal setae lanceolate, strongly serrate and inserted on tubercules, except for J5 smooth, setiform and sharp-tipped, peritreme extending to level of j1, three setae on the ventrianal shield with small punctiform pre-anal solenostomes, three thick macrosetae strongly knobbed. This is a unique combination of characters which make specimens of this species very different from all other species within the genus Typhlodromus, subgenus Anthoseius.

Description of adult male (n = 4, Figs. 14 a-d)
Dorsum (Fig. 14a) – Dorsal shield strongly ornamented, 231 (220–240) long and 136 (130–150) wide, with five solenostome well visible (gd2, gd4, gd6, gd8 and gd9), only two pairs of poroids visible (probably because of the strong ornamentation), 20 pairs of dorsal setae (r3 and R1 on dorsal shield): j1 13 (12–14), j3 13 (11–15), j4 12 (11–13), j5 13 (11–14), j6 15
Figure 14 Paratype male of *Typhlodromus (Anthoseius) grewiae* Zannou, Moraes & Oliveira – a. Dorsal shield, b. Ventral shields, c. Spermatodactyl, d. Genu, tibia and basitarsus of leg IV.
(14–15), J2 17 (15–20), J5 8 (8–9), z2 12 (10–12), z3 12 (9–13), z4 15 (13–18), z5 14 (13–15), Z4 21 (19–23), Z5 26 (24–29), s4 14 (14–15), s6 17 (15–18), s2 18 (18–19), s4 19 (18–20), S5 16 (14–18), r3 14 (13–15), R1 12 (12–13). All setae lanceolate, plumose, strongly serrate and inserted on tubercules with presence of these tubercules starting back to a line constituted of setae r3, s4 and z5 until the posterior part of the dorsum. Seta J5 is the only seta smooth, setiform and sharp-tipped.

Peritreme and peritremal plate (Fig. 14a) – Extending to level of j1; peritremal plate fused with dorsal shield at level of j3.

Venter (Fig. 14b) – Sternogential shield smooth with few anterior and posterior striae, with five pairs of setae (st1-st5) and three pairs of poroids (iv1-iv3); distances st1-st1 37 (35–38), st2-st2 52 (50–54), st3-st3 50 (49–50), st1-st5 95 (93–98), st4-st4 36 (34–38), st5-st5 28 (25–30). Ventrianal shield 88 (83–93) long, 111 (105–115) wide at level of anterior corners, and 56 (50–63) wide at level of para-anal setae. Ventrianaal shield with few striae, with three pairs of pre-anal setae (JV1, JV2 and ZF2), and a pair of small punctiformgv3 mesad JV2, 19 (18–20) apart. Uncleromatized cuticle around ventrianal shield with a pair of setae (JV5). Seta JV5 lanceolate and strongly serrate, 15 long.

Chelicera (Fig. 14c) – Fixed digit 16 (15–17) long, with no teeth visible; and movable digit 18 (17–19) long, with one tooth visible. Spermatodactyl shaft straight, shaft 18 (17–18) long, branch 3.

Legs (Fig. 14d) – One macroseta only on leg IV: St IV 15 (13–15), blunt and knobbed. Genua II and III both with seven setae. Chaetotactic formula of genu II: 2-2/0, 2/0-1; genu III: 1-2/1, 2/0-1.

Specimens examined. Four ♂♂ collected during this study, measured and deposited as complementary voucher material. MAYOTTE ISLAND: Combani, gîte du Mont-Combani (437 m aasl, 12°48′23″ S, 45°9′17″ E), 1 ♂ on Cananga odorata (Lamark) Hooker & Thomson (Annonaceae) or Ylang-Ylang, 25/XI/2018. MOHELI ISLAND: Bangoma, top of the village (42 m aasl, 12°17′15″ S, 43°43′40″ E), 3 ♂♂ (and 1 ♀ on the same slide) on Dendrocnide moroides (Weddel) Chew (Urticaceae), 4/XII/2018.

Voucher material. Four males on two slides (one with one female) are deposited in Institut Agro (Montpellier SupAgro) – INRAE Acarology collection, Montpellier, France.

Remarks. Characters of males are very similar to that of females, except for course of length of setae and few other characters. Ventrianaal shield of the male is slightly striate and the ventrianaal shield of the female is entirely smooth. Morphological characteristics of this species are so unique within the genera Typhlodromus, subgenus Anthoseius that is possible to identify the species based on a single male alone.

Typhlodromus (Anthoseius) hartlandrowei Evans

Typhlodromus (Typhlodromus) hartlandrowei Evans 1958: 580; Chant 1959: 60.
Clavidromus hartlandrowei, Muma 1961: 296.
Typhlodromus (Neoseiulus) hartlandrowei, Pritchard & Baker 1962: 222.
Typhlodromus (Anthoseius) hartlandrowei, Moraes et al. 2004b: 328; Chant & McMurtry 2007: 155; Ueckermann et al. 2008: 50.

Diagnosis. The male of this species has four solenostomes (gd2, gd6, gd8 and gd9), all dorsal setae serrate and knobbed, except for j1, z2, S5 and r3 sharp-tipped, J5 smooth and sharp-tipped similar to adult female, peritreme extending to level of z2, three setae on the ventrianal shield with small punctiform pre-anal solenostomes, three macrosetae strongly knobbed. This is a unique combination of characters, which make specimens of this species very different from all other species within the genus Typhlodromus, subgenus Anthoseius.

Description of adult male (n = 1, Figs. 15 a-d)

Dorsum (Fig. 15a) – Dorsal shield slightly striate anteriorly and behind setae S2-J2 line, 225 long and 150 wide, with four solenostomes well visible (gd2, gd6, gd8 and gd9), with eight visible poroids, 20 pairs of dorsal setae (r3 and R1 on dorsal shield): j1 21, j3 34, j4 23,
Figure 15 Paratype male of *Typhlodromus (Anthoseius) hartlandrowei* Evans – a. Dorsal shield, b. Ventral shields, c. Spermatodactyl, d. Genu, tibia and basitarsus of leg IV.
Acarologia

Kreiter S. et al. (2021), Acarologia 61(4): 845-889. https://doi.org/10.24349/Krky-e23s

Typhlodromus (Anthoseius) lobatus Zannou, Moraes & Oliveira

Typhlodromus (Anthoseius) lobatus Zannou, Moraes & Oliveira in Ueckermann et al. 2008: 59.

Diagnosis. The male of this species has four solenostomes (gd2, gd4, gd6 and gd9), all dorsal setae sub-equal in length, smooth, except for Z4 and Z5 serrate and knobbed, peritreme extending to level between j3 and z2, four setae on ventrianal shield, one macroseta on basitarsus of leg IV, knobbed. This is a unique combination of characters that makes specimens of this species very different from all other species within the genus Typhlodromus, subgenus Anthoseius.

Description of adult male (n = 2, Figs. 16 a-d)

Dorsum (Fig. 16a) – Dorsal shield with some reticulations close to edges of dorsum from seta j3 to anteriad of R1 and less marked at level of setae S2-S4, 200–203 long and 105–125 wide, with only four pairs of visible solenostomes (gd2, gd4, gd6 and gd9), five pairs of poroids visible, 20 pairs of dorsal setae (r3 and R1 on dorsal shield): j1 13–14, j3 23, j4 17, j5 17, j6 20, j7 23, j5 9–10, z2 14–15, z3 20, z4 23–25, z5 19, Z4 23–24, Z5 25, s4 23–24, s6 23–24, S2 25, S4 20–22, S5 18–20, r3 20, R1 18. All setae smooth and sharp-tipped, except for Z4 and Z5 serrate and knobbed.

Peritreme and peritremal plate (Fig. 16a) – Extending to level between j3 and z2, much closer to z2; peritreme plate fused with dorsal shield at level between z4 and s4.

Venter (Fig. 16b) – Stermogenital shield with few lateral striae, with five pairs of setae (st1-st5) and three pairs of poroids (iv1-iv3). Distances st1-st1 32–38, st2-st2 38–39, st3-st3 38–40, st5-st5 90–91, st4-st4 31–33, st5-st5 28–30. Ventrianal shield 84–88 long, 80–100 wide at anterior corners and 40–50 wide at level of para-anal setae. Ventrianal shield with noteethvisible. Spermatodactyl shaft straight, shaft with dorsal shield at level of Z2 wide, with only four Anthoseius Typhlodromus JV5 ventrianal shield with a pair of setae (JV1, JV2 and ZV2) and a pair of small punctiform gv3 mesad JV2, 20 apart, two pairs of poroids (iv5 and iv6). Unsclerotized cuticle around ventrianal shield with a pair of setae (JV3). Seta JV5 smooth and knobbed, 48 long.

Chelicerae (Fig. 15c) – Fixed digit 20 long, with no teeth visible; and movable digit 20 long, with no teeth visible. Spermatodactyl shaft straight, shaft 15 long, branch with hook-shape 4.

Legs (Fig. 15d) – Three macrosetae only on leg IV all strongly knobbed. Measurements: Sge IV 20, St IV 15, St IV 36. Genua II and III both with seven setae. Chaetotactic formula of genu II: 2-2/0, 2/0-1; genu III: 1-2/1, 2/0-1.

Specimens examined. One single ♂ collected during this study, measured and deposited as complementary voucher material. ANJOUAN ISLAND: Pomoni, exit of the village (29 m asl, 12°17′01″ S, 44°34′37″ E), 1 ♀ and 1 ♂ on Piper nigrum (Fig. 15b) – Fixed digit 20 long, with no teeth visible. Spermatodactyl shaft straight, shaft 15 long, branch with hook-shape 4.

Remarks. Characters of males are very similar to that of females, except for course of length of setae and few other characters. Ventrianal shield of the male is reticulate as that of female, the sternogenital shield is almost reticulate, of normal size, macroseta StIV of leg IV in the male is the longer followed by SgeIV and StIV as in adult female, seta JV5 smooth and sharp-tipped as in adult female. The only difference concerns dorsal setae: setae j1, z2, S5 and r3 are sharp-tipped in adult female, while also j3, j5, j6, z3 and z4 in the male.
Figure 16 Paratype male of *Typhlodromus (Anthoseius) lobatus* Zannou, Moraes & Oliveira – a. Dorsal shield, b. Ventral shields, c. Movable degit and spermatodactyl, d. Genu, tibia and basitarsus of leg IV.
reticulate with four pairs of pre-anal setae (JV1-JV3 and ZV2) and no solenostome; a pair of iv5 and two pairs of ivo discernible. Unsclerotized cuticle around ventrianal shield with a pair of setae (JV5). Seta JV5 smooth, 16–18 long.

Chelicerae (Fig. 16c). Fixed digit 15 long, with three teeth discernible; and movable digit 16 long, with one tooth discernible. Spermatodactyl shaft 13–14 and branch 7.

Legs (Fig. 16d). Legs IV with one knobbled macroseta similar to adult female on basitarsus IV: StIV 19–20. Chaetotactic formula of genua II and III similar to adult female: genu II 2-2/0, 2/0-1; genu III 1-2/1, 2/0-1.

Specimens examined. Two ♂♂ collected during this study, measured and deposited as complementary voucher material. MAURITIUS ISLAND: Morne-Brabant (249 m aasl, 20°22′05′′ S, 57°29′31′′ E), 1 ♀ and 1 ♂ on Chromolaena odorata (L.) R.M. King and H. Robinson (Asteraceae), 5/XI/2018. RODRIGUES ISLAND: Mont Lubin (346 m aasl, 19°42′21′′ S, 63°26′40′′ E), 1 ♂ on Urena lobata L. (Malvaceae), 15/XI/2018.

Voucher material. Two ♂♂ on two slides are deposited in Institut Agro (Montpellier SupAgro) – INRAE Acarology collection, Montpellier, France.

Remarks. Characters of males are very similar to that of females, except of course for length of setae and other characters. Ventrianal shield of the male is reticulate, while that of female not. All other characters are similar to adult female, and the male of this species is very similar to males of other species, making difficult the identification of the species without collection of males and females together.

Conclusion
Six new species to science and six unknown males have been collected and described in this paper along with a new record, namely: Paraggagnathus philippei Kreiter n. sp., Amblyseius erici Kreiter n. sp., Typhlodromips culmus new record, unknown males of three species of Amblyseius: A. duplicisetus, A. haleakalus and A. parasundi, Typhlodromus baillodi Kreiter n. sp., Ueckermannseius gutierrezi Kreiter n. sp., Ueckermannseius jean-mariei Kreiter n. sp., Ueckermannseius payetae Kreiter n. sp., unknown males of three species of Typhlodromus (Anthoseius): T. (A.) grewiae, T. (A.) hartlandrowei and T. (A.) lobatus. These species have to be added to the species list of Archipelagos, Mascareignes and Comoros. A catalogue and a key for all species of both Archipelagos will be published in a following paper.

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